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ABSTRACT

This instructor's guide accompanies the self-paced student training modules on the Painting Trade, one of which is available separately as CE 032 879. Introductory materials include an introduction to pre-apprenticeship and its three phases of training, a recommended procedure for conducting pre-apprenticeship training, and a course outline. Teaching outlines are then provided for the 12 modules that comprise this course. For each module some or all of this material may be presented: instructional outcomes; introduction; outline of content with teaching methods and aids listed and/or sketched, notes for self-assessment, assignment, and post assessment; and suggested readings. Modules include Introduction to Painting Trade, Diagnostic Testing/Painter, Survival Skills, Trade Math (diagnostic test and remedial work), Physical Requirements, Safety, First Aid, Blueprint Reading, Trade Tools, Trade Equipment, Materials, and Applied Painting Techniques (student projects). Project sheets are provided. An occupational analysis/task inventory for painter is appended. (YLB)

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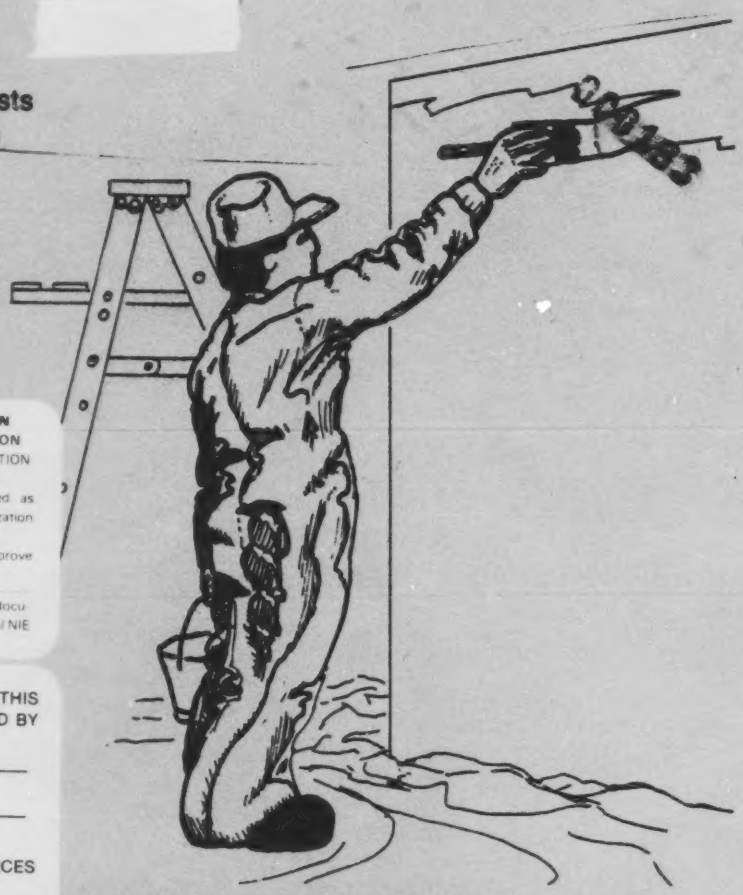
INDIVIDUALIZED LEARNING SYSTEMS

PRE-APPRENTICESHIP

PHASE 1 TRAINING
Instructor's Guide

Painter

Diagnostic Tests
Survival Skills
Math
Tools
Materials
Project



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INTRODUCTION TO PRE-APPRENTICESHIP

DESCRIPTION OF APPRENTICESHIP

The Federal Bureau of Apprenticeship identifies an apprenticeable occupation as a skilled occupation that requires a minimum of one year of 2000 hours on-the-job training. This on-the-job training and related educational training is the apprenticeable period.

VIEWPOINTS ABOUT PRE-APPRENTICESHIP

Pre-apprenticeship is viewed in many different ways by craftpersons, apprenticeship committees, educators and the general public.

Concerns about pre-apprenticeship include the belief that the pre-apprenticeship training will flood the market with applicants for apprenticeship or that these trainees will go to work in the occupation as partly trained workers or that pre-apprenticeship would be considered a guarantee of entry into apprenticeship. These conflicting viewpoints create problems for persons interested in apprenticeship training and make it difficult to operate pre-apprenticeship training programs.

NEED FOR PRE-APPRENTICESHIP

Pre-apprenticeship provides three benefits:

1. Provides a screening device to determine motivation, interest, manipulative aptitude and ability of persons to learn the skills of the occupation.
2. Provides the individual with survival skills for handling personal problems and interpersonal relations on the job that may include abuse and sexual harrassment.
3. Provides entry level skills to help make the apprentice productive from the first day on the job. The higher entry level skills of the apprentice provides an incentive for the employer to hire apprentices.

PRE-APPRENTICESHIP HELPS PEOPLE

To select a skilled occupation.
To identify the educational requirements of an occupation.
To experience the hands-on skills of an occupation.
To develop good work habits.

* Good job attendance
* Punctuality
* Dependability
* Time management

To develop good attitudes.

* Concern for the job
* Initiative
* Interest
* Healthy, cooperative working relations with fellow employees.

TRAINING LEVELS FOR PRE-APPRENTICESHIP

Pre-apprenticeship training can be separated into three phases or stages of training. These are:

PHASE 1

Provides the trainee with an opportunity to explore several occupations. This orientation to the welding trade includes training in trade terminology, blueprint reading, tool usage, first aid and safety practices. This familiarization training includes hands-on experience in some of the basic skill areas together with information about the advantages and requirements of welding. The choice of an occupation to train for in Phase 2 of pre-apprenticeship will be based on these experiences. If the trainee decides not to pursue this occupation any further, the training received to this point will be useful in every day life.

Phase 1 includes diagnostic tests to determine if reading or mathematical deficiencies exist that would handicap a person in the welding trade. Remedial work will be provided to correct these deficiencies.

Success on the job is directly related to job attitudes, work habits, and the individual survival and coping skills. Training will begin on helping each individual attain full potential in these personal skills.

Interpersonal skills will be developed which include:

* Communication skills
  - paraphrasing, perception checks, non-verbal communication
  - communicating with superiors
* Personal effectiveness
  - problem solving, family relationships, sexual harrassment and pestering on the job.
* Interview techniques
  - apprenticeship committee interview procedure

PHASE 2

This training begins the serious preparation for an occupation. The training related to job attitudes, work habits and individual survival and coping skills will be continued from Phase 1 with more emphasis on the relationship to the job.

Manipulative skills will be developed by the completion of a series of projects involving basic trade skills which have a carryover benefit to persons outside of the occupation. At least 3/4 of the training will consist of hands-on experiences. This instruction should be conducted by a skilled craftsperson from the trade or occupation who has the necessary teaching skills.

The joint apprenticeship committee for the occupation will be invited to observe the progress of trainees during Phase 2 and to evaluate the potential for trainees for entry into apprenticeship. The participation of the appropriate joint apprenticeship committee is essential to the success of a pre-apprenticeship program. This community involvement insures that the training is relevant to the occupation and meets industry training standards.

At the completion of Phase 2 the trainee will have enough experience with the occupation to decide whether to continue with the training into Phase 3. The joint apprenticeship committee will have knowledge of the quality of the training program and will be in a position to judge the qualifications of the students for entry into the apprenticeship training program.

PHASE 3

Training is concentrated on improvement of manipulative skills so that the trainee will be a productive employee the first day on the job. This training can be either industry conducted specialized training, secondary school vocational programs or community college preparatory courses specifically related to the occupation. Trainees can also participate in co-op work experience involving hands-on training at the secondary or community college level. Hands-on training is considered essential for an effective pretraining program.

The Phase 3 training period provides the trainee with an opportunity to search for an employer willing to take an apprentice. Frequently the employer providing co-op work experience training will hire the trainee as a regular employee.

It is possible that some employers will hire the trainee without further training. Some of these employers train specifically for their own needs. In the process, job descriptions have become highly diluted. Instead of producing journeymen possessing a wide range of skills, companies have settled for specialists trained to perform the specific tasks needed in certain narrow operations. While this may be adequate to meet the special needs of an industry, it certainly will not meet the training and manpower needs of the nation in the future.

Apprenticeship provides a broad base of training by giving the apprentice a wide range of skills which insures continuous employment. Workers least vulnerable to unemployment are those with the highest and broadest skills and best training. The trainee should make every effort to enter an apprenticeship training program designed to provide training in all skills required

in the trade or go to work for an employer who will provide broad based training.

Each trainee will choose a joint apprenticeship committee meeting to attend during Phase 3 training. This will provide an opportunity for the trainee to become acquainted with members of the joint apprenticeship committee and to see how the committee functions.

PHASE 4 EMPLOYMENT AS AN APPRENTICE

Trainee enters apprenticeship training on a direct referral basis under agreement with the appropriate joint apprentice committee which permits persons trained in programs financed with federal funds to enter apprenticeship on direct referral. Direct referral eliminates several of the procedures in the selection process and makes entry into apprenticeship less cumbersome.

Not all joint apprenticeship committees use the direct referral system. This is the reason why sponsors of pre-apprenticeship training should directly involve joint apprenticeship committees in the operation of their programs. This provides committees with an opportunity to evaluate the effectiveness of pre-apprenticeship.

The federal Job Corps Programs enjoy direct referral placement in apprenticeship for their graduates. The Job Corps operates an ideal pre-apprenticeship program. Proposed sponsors of pre-apprenticeship training are advised to visit the nearest Job Corps Center to see how the programs operate.

The Job Corps Centers in Oregon are located at:

Angel Job Corps
Star Route North
Yachats, OR 97498
547-3137

Timber Lake Job Corps
Star Route Box 109
Estacada, OR 97023
834-2291

Wolf Creek Conservation Center
Little River Route
Glide, OR 97443
496-3507

Tongue Point Job Corps
Astoria, OR 97103

325-2131

Job Corps Centers in Oregon Offer Training in these apprenticeable occupations:

Carpentry
Cement Mason
Brick Laying

Plastering

Tile Setting

Automotive
Painting

RECOMMENDED PROCEDURE FOR CONDUCTING PRE-APPRENTICESHIP TRAINING

ADMINISTRATION

Pre-apprenticeship training can be conducted by various sponsors. These include: secondary schools, community colleges, unions, employer associations, labor/management training trusts and private groups such as O.I.Cs.

ADVISORY COMMITTEES

Use of broad-based community advisory committees is mandatory for pre-apprenticeship programs conducted by secondary schools and community colleges. Pre-apprenticeship needs the support and recognition of the community in order to be successful.

The advisory committee should have representatives from these groups:

School administration
- high school principal
- board members
- vocational director
- co-op work experience
- T & I instructors

Community
- school graduate in trade
- member of joint apprenticeship committee
- employer member of trade
- employee member of trade
- union business agent
- industry training coordinator
- representative of financial community
- representative of press

Government personnel
- ESD regional vocational coordinator
- Oregon Division of Apprenticeship field representative
- Federal Bureau of Apprenticeship representative
- State Dept. of Education specialist

FINANCING

Vocational training programs generally cost more than academic programs because the student/teacher ratio is smaller, consumable supplies are required, and expensive equipment is needed. Resources to finance pre-apprenticeship training are available from a number of sources. These include:

Vocational rehabilitation	-tuition fees
Federal funds for immigrants	-Asian -Cuban -Spanish American
Special grants	-U.S. Dept. of Labor U.S. Dept. of Education CETA Industry State Dept. of Education Economic Development Administration
Secondary school funding	-basic school grant from federal funds
Community college funding	-basic state funding

INSTRUCTIONAL DELIVERY SYSTEMS

The type of sponsor for pre-apprenticeship training will determine the time-block used for the program. If training is started at the 9th grade level, a two-hour training period will generally be used. A half-day training period should be used for an accelerated program at the secondary level covering two years. Community college programs can be either half-day or full-day programs. Private sponsors generally will operate on a full-day basis.

Instructors for the trade specific training should be qualified craft workers. These may be employed on a part-time basis, or full-time, serving several programs. The necessity for skilled workers to teach the trade specific items of the program

cannot be over-emphasized. The work experience of skilled craft workers gives them the insight into the occupation needed for effective teaching.

MANIPULATIVE SKILL TRAINING

The manipulative skills or hands-on experiences provide the basis for a sound and effective pre-apprenticeship training program. Unless this training is available the program will not succeed.

Important considerations involve the following items:

Basic tools	-tools required for each participant
General or shop tools	-power tools (purchased or rented)
Materials	-purchased by training agency -purchased by others (training project sponsor) -donations by industry (defective goods)
Training facilities	-school based -community based
Training projects	-school maintenance work -simulated projects -community projects -private projects (non-profit organizations-low income persons)

COORDINATION WITH EXISTING PROGRAMS

Pre-apprenticeship should be coordinated with related programs in secondary schools and community colleges.

Welding	Electronics
Blueprint reading/drafting	Industrial mechanics cluster
Surveying	Construction cluster
Automotive	Electricity/electronics cluster

MISCELLANEOUS CONSIDERATIONS

Legislation, community support and political considerations will all have an effect on pre-apprenticeship training. Activities related to these concerns include:

Workshops and technical assistance	-State Dept. of Education
Publicity notices	-public service -newspaper -radio -translation to Asian/Spanish American
Civil rights	-effect of civil rights compliance
Transfer of learning	-benefits of vocational training to other occupational endeavors

COURSE OUTLINE

1.0 Introduction to the Painting Trade

- 1.1 History
- 1.2 Painting Trends
- 1.3 Working Conditions
- 1.4 Hiring Procedures
- 1.5 Wages
- 1.6 Common Worker Benefits
- 1.7 Trade Terminology

2.0 Diagnostic Testing

- 2.1 SATB

3.0 Survival Skills

- 3.1 Expectations
- 3.2 Communication Skills
- 3.3 Giving and Receiving Feedback
- 3.4 Dealing with Interpersonal Conflict
- 3.5 Group Problem Solving, Goal Setting and Decision Making
- 3.6 Wider Influences and Responsibilities
- 3.7 Identifying and Developing Individual Strengths
- 3.8 Worksite Visits
- 3.9 Resumes
- 3.10 Interviews
- 3.11 Appropriate Work Habits and Attitudes

4.0 Trade Math

- 4.1 Math Diagnosis
- 4.2 Math Remedial

5.0 Physical Requirements

- 5.1 Physical Requirements
- 5.2 Developmental Processes

6.0 Safety

- 6.1 General Safety
- 6.2 Personal Safety
- 6.3 Fire Types and Prevention
- 6.4 Hygiene Safety
- 6.5 Hand Tool Safety
- 6.6 Power Tools

7.0 First Aid

7.1 First Aid

8.0 Blueprint

8.1 Scaling and Dimensioning
8.2 Sketching
8.3 Drawing Types and Views

9.0 Trade Tools

9.1 General Tools

10.0 Trade Equipment

10.1 Related Equipment

11.0 Materials

11.1 Trade Materials

12.0 Project

II. WORD TO THE INSTRUCTOR

This course was designed to be a trade-related, self-screening, job exploration package, providing the student with basic trade theory, basic trade manipulative practice, projects and on-job-site visitations.

Further, it is to be implemented by instructors who are skilled in each of the general topics described in the course outline and expanded on in the instructor's guide.

The curriculum is comprised of two parts: 1) the instructor's guide, and 2) supporting modules and references which are specified in the instructor's guide. The instructor should seek other supporting resources where available or necessary.

The instructor should bear in mind that there are two broad objectives written into the design of this course: 1) that the student will receive instruction in the preapprenticeship mode of the trade (which is designed to enable him or her to gain enough exposure to the trade to (a) aid in making a career decision, and (b) facilitate entry into the trade), and 2) that the student will retain some carryover skills which he or she can use in life, even should the student decide not to enter the trade.

Essentially, this guide is patterned after a program begun in Oregon in 1979-80. The participants in the program are wholly CETA-sponsored, many with motivational or physical impairments. The program concentrates on providing motivational support and/or physical therapy. A typical program, broken down into its major components, would be:

40% hands-on, manipulative work
30% motivational support work
10% job visitation
5% physical development or therapy
15% class lecture, discussion, etc.

Not all institutions will have the resources, nor will all programs' students have the need, for such a breakdown. The instructor should identify the needs of the students and utilize the guide in the manner best suited to meet them.

III. RECOMMENDATIONS

Hands-on work is probably the best learning experience for students in trade work. It is essential if the two broad objectives listed above are to be met. Therefore, implied in the topics covering tools, materials and tasks or work processes is the notion (emphasized in the Instructional Outcome for these topics) that the student will practice using the tools and materials described therein.

In lieu of describing in the Teaching Methods and Aids section of the guide those tasks which will be performed with the described tools and materials, the writers leave it to the imagination and material resources of the instructor. Practice is the method by which skill is developed.

1.0 Introduction to the Painting Trade

INSTRUCTIONAL OUTCOMES: The student will be able to identify and briefly explain the history, painting trends. working conditions, hiring procedures and wage scale, as well as working people's benefits and trade terminology.

INTRODUCTION: In order to become an effective worker or make an effective realistic career decision, an individual must be exposed to various aspects of the trade.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
1.1 History A. First use of paint is unknown. B. Paintings done in prehistoric times were found in Italy, France, and Spain. C. Three colors were used. 1. Red. 2. Yellow. 3. Black. D. Ancient European civilizations all used paints. They included the: 1. Egyptions. 2. Babylonians.	Explain and Discuss ILS Introduction to the Painting Trade

3. Greeks.
4. Romans.
5. Early Christians.

E. There were few paintings during the Dark Ages (400 to 800 A.D.).

F. Painting became a craft during the Renaissance.

G. When America was discovered, North American Indian tribes were using dyes and pigments.
   1. Indians painted their bodies, baskets, rugs and pottery.

1.2 Painting Trends

A. Today the paint industry annually sells approximately three billion dollars worth of merchandise.

B. The paint industry produces almost 880 million gallons of paint a year.
   1. There are 1500 paint factories.
   2. The factories employ about 60,000 workers.

C. Paint has been based on vegetable oils, such as linseed, since ancient times.

D. Advanced technology has affected the protective coating industry.

E. Alkyds have replaced linseed oil for maintenance and industrial painting.

F. Resin containing materials are produced at the rate of one half billion pounds per year. G. Latex paints were introduced during World War II. 1. Were used for both inside and outside painting. H. The industry's most spectacular development was the epoxy resins. 1. Have good adhesion qualities. 2. Resistant to solvents, chemicals, alkalis and acids. I. Urethane resins are abrasion-resistant, therefore excellent as floor coatings. 1. Are used in other areas of specialized maintenance.	
1.3 Working Conditions A. A large percentage of the jobs are performed on the site. B. Working conditions must be favorable to the type of product being used. 1. Also affect the type of installation being done. C. Work is often seasonal. D. Outside work is limited by the weather. E. Environment may be dirty and hazardous.	Jobsite Visitation Invite Job Specialist

F. Observing safety rules regarding protective gear helps eliminate exposure to paint fumes.
   1. Some materials in use may cause allergic reaction.

1.4 Hiring Procedures
A. Several methods may be used to find a job.
   1. Try to find a job yourself.
   2. Check with the apprenticeship information center.
   3. Contact union business representatives.

1.5 Wage Scale
A. Apprentice beginning wage is about $7 per hour.
   1. With time and experience, hourly wage of the apprentice increases.

B. Journeyman's wage is over $13 an hour.

C. Union dues increase each year the apprentice is employed.

1.6 Common Worker Benefits
A. Unemployment Insurance
   1. Purpose.
      a. transition from job to job.
      b. ease strain of layoffs.
   2. Source of benefits.
      a. payroll tax on wages.
   3. Eligibility.
      a. depends on base year earnings.

Explain and Discuss
ILS Common Worker Benefits
Invite Field Rep
Workmen's Compensation Board
BOL Wage and Hour
Employment Division

b. depends on reasons for leaving work.

4. Level of benefits.
   a. level of base year earnings.
5. Claims process.
   a. report to Employment Division office.
   b. provide required information.
      (1) employer's name and address.
      (2) your social security number.
      (3) wage earning records.
      (4) current address.
6. Appeals/hearing process.
   a. initiated by worker.
   b. in writing.
   c. within time limits.

B. Wage and Hour Commission
   1. Purpose.
      a. to investigate and attempt equitable settlement of wage claims.
   2. Areas of claim review.
      a. pay periods.
      b. pay days.
      c. final pay days.
      d. wage payments in cases of dispute.
      e. methods of compensation and overtime.
      f. minimum wage laws.
      g. limitation of hours in certain industries.
      h. restrictions on employment of minors.

3. Jurisdiction.
   a. Federal vs. State.
4. Claim Process.
   a. contact wage and hour commission.
   b. provide required information on appropriate form.
      (1) dates of employment.
      (2) rate of pay.
      (3) reason for non-payment.
      (4) estimate of disputed amount.
   c. wage claim conference.
   d. collection process.
   e. protection against retaliation for filing a claim.
5. Time limits for filing.
   a. regular pay.
   b. overtime pay.

C. Workers Compensation
1. Purpose
   a. provide medical care payment for on-the-job accidents.
   b. provide time loss payments.
   c. provide payments for permanent disability.
   d. provide death benefits.
2. Source of benefits.
   a. employer premiums for insurance.
   b. employee contributions.
3. Level of benefits.
   a. complete for medical costs.
   b. varies according to level of final disability.

4. Eligibility.
   a. any job-related accident or condition causing the worker to leave work and seek medical treatment.
5. Claim process.
   a. report accident to employer.
   b. fill out claim form.
      (1) know your employer's legal name.
      (2) know your employer's insurance carrier.
   c. see your doctor for treatment.
6. Final determination.
   a. doctor's statement of stabilized condition.
   b. board's findings of disability and payment.
7. Reopening claim for aggravation of injury without a new injury.
   a. contact employer's insurance company if occurs within the first five years.
   b. contact worker's compensation board after five years.

1.7 Trade Terminology

A. Common Trade Terms.

1. Enamel--paint consisting of pigments mixed with varnishes or lacquers.
2. Varnish--liquid composition which is converted to a translucent or transparent solid film after application in a thin layer.

3. Lacquer--finishing material that dries by the evaporation of solvents or thinners.
4. Emulsion paint--paint made by emulsifying (suspending) the film forming portion in a volatile liquid, usually water. Latexes are an example.
5. Pigment--material used to impart color, opacity, certain consistency characteristics in paints.
6. Stain--paint solution containing pigments which penetrates into wood fibers.
7. Solvents--liquid capable of dissolving material.
8. Thinners--volatile liquids used to lower or otherwise regulate the consistency of paints and varnish.
9. Trestle ladder--ladder with steps on both sides. May be used in forming support for temporary scaffolding when used with another trestle ladder and appropriate bridging material.
10. Brush--hand-held implement made of bristles attached to handle used to apply paint. Width, length and bristle composition varies with application.
11. Roller--paint applicator with cylindrical surface area with handle. Used in applications with large surface areas.
12. Scaffolding--temporary structure to support workers at elevations above the floor.

13. Load (brush)--dipping brush about one half the bristle length into paint and tap (not wipe) excess paint.
14. Nap--length of fibers extension on roller cover. Longer nap used on rougher surfaces.
15. Flat--paint surface characteristic without sheen or "shine."
16. Gloss--paint surface characteristic where surface has a shine to it.
17. Tooth--roughened or absorbent quality of a surface which affects adhesion and application of a coating.
18. Lap marks--visible ridge lines where strokes overlap.
19. Value--used to distinguish dark colors from light colors.
20. Hue--general term used to distinguish one color from another.
21. Chroma--color purity or intensity. Used to differentiate pure colors from colors that are grayed.
22. Complementary--colors that go together in a pleasing manner.
23. Floating--separation of pigment colors on surface.
24. Lean--change in yellow pigment towards red on drying ("losing yellow").

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2.0 Diagnostic Testing/Painter

INSTRUCTIONAL OUTCOMES: The Student will complete a Specific Aptitude Test Battery (SATB), administered by a qualified examiner and will have the results explained by a qualified examiner.

INTRODUCTION: The General Aptitude Test Battery is a standardized test that has become recognized as the best validated multiple test battery in existance for use in vocational guidance. The tests are used by apprenticeship committees to assist in the screening process for appropriate candidates when apprenticeship openings occur, and to provide individuals with an indication of the probability of their being successful in a particular trade.

Many apprenticeship programs require applicants to have certain aptitudes as demonstrated by passing appropriate tests. For example, the applicant may be required to pass Specific Aptitude Test Battery (SATB) administered by the State Job Service. SATBs test two or more of the following nine general aptitudes: general learning ability (cognitive functioning), verbal aptitude, numerical aptitude, spatial aptitude, form perception (ability to perceive small detail), clerical perception (ability to distinguish pertinent detail), motor coordination, finger dexterity and manual dexterity.

Each battery tests different combinations of these nine general aptitudes because each occupation requires different specific abilities. The following SATB tests and cutting scores are required by the apprenticeship committee for the trade. The student should be aware of the trade requirements and determine how he or she feels about his or her abilities in the tested aptitudes in order to make a career decision.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
2.1 SATB A. Complete exam described below KEY: Trade Occupation Code # for the occupation SATB for the trade = Recommended cutting	

score for the trade
Location of the SATB within the GATB

PAINTER S#203
Numerical Aptitude = 90
Arithmetic Reason; Book II, Part 6
Computation; Book I, Part 3

Spatial Aptitude = 100
Three Dimensional; Book I, Part 3

Finger Dexterity = 80
#11 Assembly, #12 Disassemble, Board

Manual Dexterity = 80
#9 Place, #10 Turn, Board

	Cutting Scores		
	Adult	Grade 10	Grade 9
Numerical Aptitude	80	75	74
Spatial Aptitude	95	94	91
Manual Dexterity	85	79	76

B. Discuss Results:

3.0 Survival Skills/ Painting

INSTRUCTIONAL OUTCOMES: The student will learn and practice fundamental concepts in: a) dealing with expectations, b) communication skills, c) giving and receiving feedback, d) dealing with interpersonal conflict, e) group problem-solving, goal-setting and decision-making, f) outside influences and responsibilities, g) identifying individual strengths, h) appropriate work habits and attitudes, and, i) phases of job search and worklife.

INTRODUCTION: Training and proficiency in human relations skills are essential for successful adaptation to worklife. All too often in job preparation programs, these basic survival skills are neglected or put aside in favor of training in the technical aspects of work.

This topic describes the many skills necessary to become a stable, productive and satisfied worker.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
3.1 Expectations A. Predicting the future 1. Self-fulfilling prophecies a. setting yourself up for failure b. thinking positively	ILS Survival Skills-Expectations PREPARATION Be familiar with the material beforehand, and think up some relevant examples AVAILABILITY Be available to students. Go around those students reading the material. Be prepared to answer and ask questions that increase students' understanding.

	ELICIT RESPONSE Ask individuals what they would like to do most of all. Use their reply even if it seems trite. Suggest two alternative possibilities--the worst and the best. Ask how each would affect that student's feelings and behavior at this moment.
B. Two-step process to opening up expectations. 1. Being idealistic and realistic a. being creative and having ideas	RELEVANT COMPARISONS Illustrate creativity from movies, TV or writing. Tell the beginning of a story and ask for suggestions on how it might end. Give the original writer's version. Show how anything is allowed in creative ideas.
b. keeping close to the facts	Suggest students read court reports or news coverage.
c. effects of leaving out one of the two steps.	STUDENTS' EXAMPLES Encourage extreme examples of fantasy and of sticking close to the facts.
d. combining the two	
C. Prejudice about other groups.	EXAMPLES OF PREJUDICE Show how stereotypes arise out of stereotyped expectations.
D. Being a winner	ROLE MODEL Be heard thinking positively. Encourage positive thinking in students.

E. Self-Assessment--looking at common personal expectations F. Post Assessment	IDENTIFY PROBLEM AREAS Go through questions to see where students are putting themselves down. Give encouragement. Ask what they want to change. EXPLAIN Read through examples, answer questions. FLEXIBILITY Allow students to demonstrate their understanding in less than suggested number of situations.
3.2 Communication Skills A. Good communication 1. two-way process 2. importance 3. innate abilities 4. showing mutual respect B. Active listening. 1. Centering attention on the other person. a. being seen to be listening b. finding out what is important to the other person c. following the other person's lead d. listening to feeling 2. Checking that you have understood what the other person is communicating. a. checking feeling	ILS Survival Skills-Communication Skills. PREPARATION Be familiar with the material. BEING A ROLE MODEL Demonstrate active listening. Ensure that students voice problems and doubts. Allow frequent opportunity for students to give responses to on-going work. Be ready to demonstrate bad examples of listening, to group or individuals, and contrast with good examples.

b. checking content c. when it is inappropriate C. Being listened to. 1. Your rights as an individual 2. When to keep quiet 3. Avoiding being aggressive 4. A three-step approach a. showing you understand b. taking responsibility for your own feelings c. suggesting alternatives D. Overall importance of respect for individuals 1. Communication between equals E. Self-Assessment 1. How individuals communicate with others F. Practicing the skills in triads 1. Active listener of personal experience 2. Role play being listened to	ASSERTIVENESS Draw examples from books on being assertive. Think up appropriate examples in work context. Discuss aggressive responses with individuals. Describe alternative approaches. Discuss possible exceptions--where aggression might be appropriate. INSTRUCTOR/STUDENT RELATIONS Assess relations in class in terms of respect for, and equality of, individuals. Ask students for comments. IDENTIFY PROBLEM AREAS Give help and encouragement. Find out from students what skills they want to practice. TRIADS Form triads (trios) as students finish Self Assessment. FEEDBACK Listen to one example of active listening in each triad. Give suggestions for improvement. Be open to alternative situations for the role play. Ensure students are willing to practice being sensitive to possible reluctance and shyness. Be prepared to role play yourself.

3.3 Giving and receiving feedback

A. Importance of being able to give praise and criticism (introduction).

B. Importance of group support and teamwork
   1. Being a team member
   2. Building a team
      a. knowing where you are
      b. pulling your weight
      c. responsibilities for others
      d. group aims and goals
   3. Poor working environments
      a. indirect communication
      b. not knowing where you stand

C. Reading attitudes
   1. Hired or fired?
   2. How do you come across to other people?
   3. Interpreting other people's behavior

D. Giving and receiving positive opinions
   1. Importance of praise
   2. Taking compliments
   3. Giving praise

E. Getting and giving criticism
   1. Its importance
   2. Being criticized
   3. Avoiding being threatened
   4. Between equals

F. Self Assessment-Feelings and Preferences

ILS Survival Skills-Giving and Receiving Feedback

PREPARATION

Be familiar with the material and prepared to participate actively and equally.

FACILITATION

Facilitate continuously the building of group support. Give extra support to students who have difficulties participating fully. Enlist help of more confident and verbal to share the responsibility. Give support, but principally be a neutral chairperson or facilitator. Encourage group members to observe each others' non-verbal behavior between class times.

POSITIVE REINFORCEMENT

Give frequent verbal praise to individuals who are working well and to the group as it becomes more supportive

MONITORING

Walk around and ask permission to join in some partner discussions. Encourage greater depth. Avoid any judgments. Use paraphrase

G. Assignments 1. Telling individuals what you like	and feeling as checking skills. A DEVELOPING PROCESS Introduce when group is ready. First three assignments could be practiced even before module has been read. Explain, in turn each assignment to whole group. Deal with worries, doubts or questions before you begin.
2. Reading attitudes within the group. 3. Opening self-sharing important experiences	Use all your facilitating skills. Especially be sensitive to members' non-verbal responses. Follow up, after the class, on any individual who is upset. At all times encourage positive support within the group. Be prepared to intervene if criticism becomes too negative.
4. Receiving direct positive feedback 5. Receiving direct positive and negative feedback	
H. Post Assessment	Organize small groups or lead discussion of whole group. Use small groups to extend each individual's range of interactions.
3.4 Dealing with interpersonal conflict	ILS Survival Skills-Dealing with Interpersonal Conflict
A. Consequences of poor interpersonal relations	PREPARATION Be familiar with the material and ready to supply further relevant examples from the

	world of work.
B. Recognizing conflict in a work context 1. Open arguments 2. Possible causes 3. Consequences	
C. Them and Us atmosphere 1. The conditions you deserve 2. Whose responsibility?	BE AVAILABLE Encourage students to comment and question points as they arise. Ask them to come up with their own examples, either confirming or disconfirming the information.
D. Unproductive ways of solving conflict 1. Finding someone to blame	
E. Productive ways of solving conflict 1. Taking responsibility for doing something about it a. when people feel threatened by you b. when you feel threatened	RESPONSIBILITY Throughout Survival Skills, individual responsibility is repeatedly stressed. Periodically, reassess your own role. Avoid being pushed into the "expert" stance. Try to be an impartial facilitator, encouraging student's learning without passing judgments. Ensure students take responsibility for what they want to achieve.
F. Remaining passive. 1. Poor working conditions 2. Physiological and psychological problems 3. Irrational fears a. fear of not being liked b. fear of hurting others	
G. Action model for solving interpersonal conflicts 1. Choosing the best time 2. Taking responsibility for your feelings	

3. The four-step language formula. a. tell the other person that what he or she is doing is upsetting you b. speak your feelings c. describe how his or her behavior is affecting you d. suggest an alternative H. Negotiating 1. Give and take 2. Compromise I. Discrimination and prejudice 1. Different types 2. Dealing with it	
J. Self Assessment	IDENTIFY IMPORTANT GROUP ISSUES Deal in a neutral manner with examples of discrimination. Ask individuals for personal experience of racial and sexual prejudice and discrimination. Facilitate discussion on Equal Opportunity and Affirmative Actions. Invite solutions to problems from group members. NEW ISSUES Be aware of any controversial issues that arise during the Self Assessment. Introduce them to the group for general discussion.
K. Assignments 1. Sharing in small groups.	ORGANIZE GROUPS Form groups as students finish writing. Limit talk to five minutes on each topic. Maintain some urgency by announcing the five minute intervals.
L. Post Assessment 1. The formula	COLLECT WORK Read and make encouraging

2. Personal examples	written comments. Arrange contract for completion of work with any students who produce low standard work.
3.5 Group Problem Solving, Goal Setting and Decision-making A. 10-step model 1. Define the problem 2. Look at the known facts a. what is happening b. who is involved c. when does the problem occur d. where does it occur e. why has it become a problem 3. Agree on your goals 4. Pool ideas for achieving your main goal without evaluating them 5. Look more closely at some of the more interesting and unusual ideas 6. Include any other ideas that you think might be helpful 7. Agree on some guidelines for achieving your goal a. be specific about minimum behavior required 8. Decide on a plan to implement your proposed solutions 9. Assess the likelihood of success 10. Evaluate the success of your decisions after they have been implemented. B. Self Assessment	ILS Survival Skills-Group Problem Solving, Goal Setting and Decision-Making PREPARATION AND MATERIALS Know the 10-step model without having to refer to it on the page. Work through the process beforehand. Have photocopies of the model. Have ready one large newsprint pad and one marker for every five students. Choose about six examples of unusual tools or materials that students are unlikely to have seen. Have them ready, but hidden. Get advice from specialists beforehand. AVAILABILITY Go around students in class while they are reading material. Help them understand the 10 steps. CHECK LACK OF UNDERSTANDING Look over individuals' answers. Give help for misunderstandings.

C. Assignment in small groups

1. Producing quality of ideas
2. Practice in thinking creatively

MATERIALS REQUIRED

Sheets of newsprint and sufficient markers

ARRANGE GROUPS

During these assignments, there may be laughter and a lot of excited talk. Encourage composition of groups on basis of who works well together rather than primary friendships. Keep groups separated by space. Go around groups, sit in and participate. Keep up speed of work by giving limited time to gather ideas.

Invite spokesperson from each group to report back on ideas. Write down ideas as they are given and summarize range of proposed solutions.

3. Identifying unusual objects.

OBJECTS REQUIRED

Supply one object for each group. Choose trade tools or materials that most students are unlikely to have used.

4. Quality circle

MONITOR PROGRESS

Encourage written records of proposed solutions. Ensure all members of each group take some responsibility for finished product. If possible, get results typed out so they can be shared within larger group.

D. Post Assessment	PREPARE HANDOUT Have copies of 10-step model. Make sure students check what they have written and correct it. PERSONAL EVALUATIONS Invite students to read out or tell others what they wrote under 2 in the Post Assessment.
3.6 Wider influences and responsibilities A. Relations with people in authority 1. Formal workplace a. job titles b. hierarchy 2. Informal workplace a. unwritten rules and unstated expectations 3. Showing respect and being relaxed	ILS Survival Skills-Wider Influences and Responsibilities PREPARATION Be familiar with the module and gather useful newspaper cuttings, brochures and leaflets that illustrate the range of possible influences on somebody settling down to work. BE A READY RESOURCE Give examples informally to students from personal experience to back up information. DRAW ON STUDENTS' EXPERIENCE Encourage individuals to think of relevant illustrations from their own experience in a work setting.
B. Relations with family and friends 1. Changes in responsibilities 2. Affects of changes on old relationships a. being prepared b. communicating problems 3. Planning quality time a. keeping work problems at work b. maintaining relationships	

4. Keeping up leisure activities
5. Home problems at work
   a. leaving problems at home
   b. serious problems

C. Other influences
1. apprenticeship
2. union
3. social organizations
4. other workers
5. state and federal agencies

D. Self Assessment

E. Assignment

F. Post Assessment

SUPERVISION

Ask students to show their answers to the Self Assessment. Since it is a test of comprehension, follow up on any difficulties revealed.

CHOOSING PARTNERS

Encourage students to work with someone different each time. After majority of students have completed assignments, hold a report-back session with whole group. Ask students to summarize and draw conclusions from reports given.

DEMONSTRATE

Show what is required by illustrating it on a chalkboard.

3.7 Identifying and developing individual strengths A. Evaluating yourself and others 1. Expectations 2. Personal theories a. predicting b. controlling B. Identifying personal values 1. Significant role models 2. Eliciting personal constructs 3. Bi-polar nature of constructs	ILS Survival Skills-Identifying and Developing Individual Strengths PREPARATION Work through module beforehand. Acquaint yourself with any areas that might cause difficulties in understanding. Make extra copies of exercise sheets. Refer to ILS Expectations. AVAILABILITY Be at hand throughout this module. For students to discover significant things about themselves, instructions must be followed closely. Ensure that students have had a personal relationship with each of people listed in right column. Ask them to put names they used to address these people. Check students' understanding of procedure. If necessary, go through method with whole group. Ensure that the description is of importance to each student and not superficial, such as hair color, etc. Stress that there is no correct answer; it is important for each person to write what seems appropriate to him or her personally regardless of what anyone else might say.

4. Identifying important personal values	ARRANGE PARTNERS Go around and offer interpretations if requested or encourage students to draw conclusions. Ask what they recognize and what is new.
5. Evaluating yourself. a. as you feel you are b. as you would like to be c. looking at the amount of congruity	DISCUSS WITH INDIVIDUALS OR SMALL GROUPS Be tentative about what is identified. The conclusions can only be significant if the individual finds them significant. Use words and phrases such as..."it seems...," "you may..." "I would guess...." "it might indicate.." Use grid to prompt questions rather than answers.
6. Evaluating significant others a. comparing ratings	IN PARTNERS Suggest each student in turn tries to describe what people the other one might like and what people he or she might not like, based on the constructs on paper. Ensure that students follow instructions closely. Encourage them to search for all influences. If they have difficulty, suggest situations where students make choices, e.g. career, friends, classes, out-of-school activities.
C. Influences on personal decisions 1. How much are you in control of your own life? 2. Positive and negative influences. a. other people b. aspects of self c. organizations	

D. Time management 1. Organizing skills 2. Being responsible for your own life 3. Prime time 4. Making a time chart a. procedure b. interpretation	EXTRA COPIES Have ready prepared extra copies of time chart Ensure agreement on completing time chart. Go over method of calculating actual time. Illustrate on chalkboard or newsprint paper; give example of one day's record. Use tally system. CHECK STUDENTS' UNDERSTANDING Do this before anyone starts recording. It might be advisable to go over procedures one day ahead and practice be done in class.
E. Post Assessment 1. Personal values 2. Influences 3. Use of time	Collect, read and hand back during class. Give encouraging comments.

3.8 Worksite Visits A. Building realistic expectations 1. Questioning job descriptions 2. The human side of the job 3. On-the-job visits 4. Talking with people in the trade B. Group visits 1. Exposure to different working environments 2. Practice in observation 3. Asking questions C. Individual visits 1. After working hours 2. Interviewing the worker 3. Arranging the visit D. Self Assessment-Comprehension E. Assignment 1. Looking at Help Wanted ads	ILS Survival Skills-Finding a Job Worksite Visits PREPARATION Arrange with any company that allows it a group visit during working hours. Have sufficient copies for use by whole class of Help Wanted ads from local newspapers. Become an informed source of possible contacts for student interviews with journeymen and apprentices. CHECK UNDERSTANDING Ensure students comprehend all of the material before making any contacts or visits. HELP WITH ASSIGNMENTS Supply Help Wanted sections--one to each student. Suggest they read through and circle in ink interesting ads. Stress importance that each works on his or her own; it is practice in looking for jobs. Collect what students write and report back

	to whole group with summary of students findings.
2. Writing realistic job descriptions.	Read and comment on students' descriptions. With individual's permission, read out selection to whole group and invite comparisons with job descriptions in newspaper.
3. Contacting a journeyman or apprentice	Supply names and encourage students to come up with own contacts. If necessary, two students could team up to make a visit. Role play telephone contact and get students to copy out suggested questions. Make individual contract with each student, setting deadlines to call, to visit and to report back. Check on progress and share with rest of group.
4. Asking questions	Arrange for individuals to report back to whole group at same session.
5. Making a group visit	Go over observations and questions beforehand. Ask students to write questions down. Divide questions, and order of asking, among group. Add any other questions suggested by group.
6. Reporting back	Ensure that each student reports his or her observations. Invite individuals to report on their feelings and findings.
7. Discussion	Lead group discussion on overall findings.

3.9 Resumes A. Nature and function 1. Self advertisement 2. Summary of strengths and skills 3. Different ways to use resumes 4. Contrast application forms B. Extracts from resumes 1. People with little work experience 2. Presenting the best interpretation of the facts C. Suggested format 1. Position desired a. finding out about the job b. matching your skills 2. Education 3. Relevant work experience 4. Other relevant experience 5. Personal data 6. References a. making a list of your achievements D. Identification of your skills 1. Personal and interpersonal skills 2. Skills used in leisure and work activities a. what could go wrong b. what skills you need to avoid mistakes c. stamp collecting d. planting a garden E. A professional finish 1. Typing 2. Paper	Arrange another worksite visit. ILS Survivial Skills-Finding a Job-Resumes PREPARATION AND MATERIALS Large pad of newsprint and sufficient markers for group. Ensure that there are adequate flat surfaces.

F. Cover letter
  1. Why them?
  2. Why you?
  3. Let's meet

G. Self Assessment
  1. Personal and interpersonal skills

  2. In a job context

  3. Analyze three examples of work

H. Post Assessment
  1. Organizing personal work experience

HELPING WITH ASSIGNMENTS

Be available throughout, when students are working on Self and Post Assessment. Write on chalkboard further suggestions of personal and interpersonal skills.

Suggest students help each other in finding relevant examples of their application of skills.

Allow partners to choose each other. Emphasize broad definition of work to include paid and unpaid, part-time, etc. Give examples.

Model how students can help each other. Go around and ask questions to elicit relevant information.

Supply sheets of newsprint and markers. Tell students to use the full area of paper. Check that students are recording all the suggested information.

Inspect sheets individually and suggest best way to organize data. Advise on where to include or omit dates and which experience to group or

2. Writing a draft resume	separate. Give encouragement and direct help with drafting of resume. Take best draft, type it and duplicate it on quality colored paper. With permission of student, share with whole group. Encourage sharing of draft resumes. Offer to help later if individuals want to develop a finished version of resume.

3.10 Interviews

A. Subjective nature of interviews
  1. Content of hiring interviews
  2. Interviewers' opinions
  3. Interviewees' opinions
B. Facts and opinions
  1. Giving honest opinions
  2. Interpreting facts
  3. Quoting references and examples
  4. Deciding what is relevant
C. Employers' expectations
  1. Objective measures of aptitude and achievement
  2. Appropriate attitudes and work habits
D. How to communicate interest and enthusiasm
  1. Be genuine
  2. Be informed
  3. Showing enthusiasm
    a. non-verbally
    b. how to speak and what to say
E. How to communicate that you will be a good worker
  1. Finding examples
F. How to show you are trainable
  1. School and non-school
G. How to show you work well with people
  1. Relations with the interviewer
  2. Giving examples
H. How to be realistic about what you want
  1. Knowledge of the work environment
  2. Knowledge of the career structure
  3. Answering questions about goals

ILS Survival Skills-Finding a Job-Interviews

PREPARATION AND MATERIALS

Read material beforehand and recall examples from own experience. Have two copies of observers' checklist for each student.

I. Appearance
  1. Clothes
  2. Grooming

J. Non-verbal behavior
  1. Punctuality
  2. Nervousness
  3. Body posture
  4. Gestures
  5. Smoking and chewing

K. Being positive
  1. About yourself
  2. About others

L. Self Assessment
  1. Role play
    a. interviewer
    b. interviewee
    c. observer
  2. List of questions
  3. Checklist

M. Post Assessment
  1. Interview in front of the group
  2. Questions from Joint Apprenticeship Committee
  3. Giving positive feedback

FORM TRIADS

Go through checklist to ensure understanding. Choose best working groups. Keep it moving by limiting time for each role play. Be willing to model positive answers in interviewee's role.

Ask for a volunteer, then allow him or her to select next interviewee. Suggest use of observer's checklist, plus any other positive comments. Give feedback from group and yourself, immediately after each interview. Invite interviewee to share his or her feelings experienced during role play.

3.11 Appropriate work habits and attitudes A. Surviving on the job. 1. Keeping informed	ILS Survival Skills-Finding a Job -Appropriate Work Habits and Attitudes BE A RESOURCE Share personal experience with individuals. Encourage students to ask any older people about work habits and attitudes. Give time for sharing students' findings.
B. Employer's expectations 1. Being punctual and dependable 2. Being honest 3. Being loyal 4. Being willing to learn and able to take criticism	Show relevance of previous modules to both 2 and 3. Ask individuals what expectations a member of Survival Skills class has.
C. Expectations of fellow workers 1. Proving your competence 2. Being reliable and dependable 3. Being a learner 4. Being enthusiastic and interested 5. Being honest and loyal	POSSIBLE DISCUSSION What do individuals expect of friends? What are peer group's attitudes toward 4?
D. Proving your competence to your supervisor 1. High standard of work 2. Keeping a written record of your achievements 3. Showing initiative 4. Taking on responsibility 5. Asking for help	
E. Interference of personal habits 1. Substance abuse 2. Seeking help	Be sensitive to possibility of substance abuse affecting student performance. Learn physical indicators; have referral addresses available.

F. Self Assessment

G. Post Assessment

Check comprehension.
Tell students to repeat reading and doing Post Assessment until acceptable standard is reached. Discuss with individuals any disagreements over appropriate answers and be flexible.

SUGGESTED READINGS:

Alberti, R.E. and Emmons, M.
Your Perfect Right
Impact, 1974.

Blicq, Ron
On the Move: Communication for Employees
Prentice-Hall, 1976

Bolles, Richard N.
The Three Boxes of Life
Ten Speed Press, 1978

Fast, Julius
Body Language
Pocket Books, 1971

Chapman, Elwood N.
Your Attitude is Showing: A Primer on Human Relations
Science Research Associates, 1972

Ford, George A.
Planning your Future: A workbook for Personal Goal Setting
University Associates, 1976

McCay, James T.
The Management of Time
Prentice-Hall, 1977

Nelson, Robert E.
Decision Making
Vision Publishing, 1976

Peale, Norman V.
The Power of Positive Thinking
Prentice-Hall, 1952.

4.0 Trade Math

INSTRUCTIONAL OUTCOMES: The student will complete a diagnostic examination to determine his or her level of math competency, and will receive instruction in those areas of mathematics in which he or she experiences difficulty.

INTRODUCTION: People in every apprenticeable occupation routinely use mathematics in their work. The skilled worker who can perform fast and accurate math calculations can work quickly and efficiently.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
4.1 Math Diagnosis A. Used to test skills 1. Math diagnostic exam, attached, or other suitable exam.	Explain "placement exam" concept Administer exam Grade performance
4.2 Math Remedial A. Used to upgrade skills 1. Modules, as listed, improve performance levels.	Assist student to achieve performance level

ILS	Math--Linear Measurement	
ILS	Math--Whole Numbers Addition Subtraction Multiplication Division	
ILS	Math--Addition & Subtraction of common fractions and mixed numbers	
ILS	Math--Multiplication & Division of common fractions and whole and mixed numbers	
ILS	Math--Compound numbers	
ILS	Math--Percent	
ILS	Math--Ratio and Proportion	
ILS	Math--Decimals Addition Subtraction Multiplication Division	
ILS	Math--Perimeters Areas and Volumes	
ILS	Math--Circumference and Area of Circles	
ILS	Math--Areas of Plane Figures, Volumes of Solid Figures	
ILS	Math--Metrics	

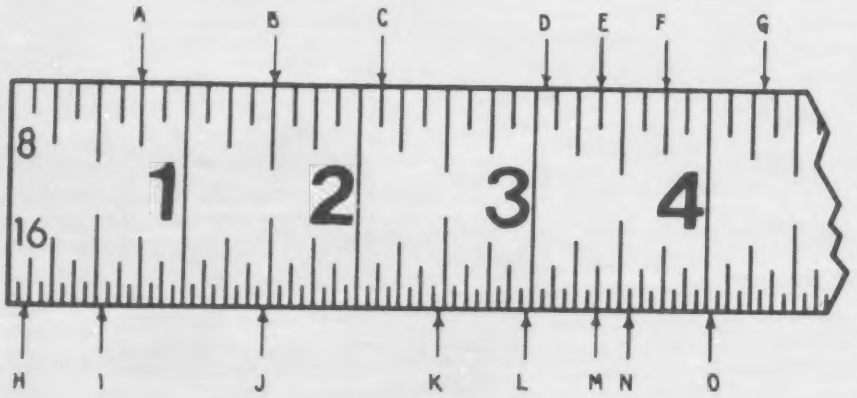
4.0 Trade Math Diagnosis
Placement Test

Name _____

Date _____

1.

Read the distance from the start of the ruler to the letters A through O to the nearest 1/32".



A= _____ F= _____ K= _____

B= _____ G= _____ L= _____

C= _____ H= _____ M= _____

D= _____ I= _____ N= _____

E= _____ J= _____ O= _____

2.

686 + 240 + 1,320 + 16 + 400 =

40 - 16 =

292 X 16 =

180 ÷ 5 =

A contractor buys 400 sacks of rock for three different jobs. On the first job he uses 78 sacks; on the second, 85 sacks; and on the third, 205 sacks. How many sacks does he have left?

A contractor's bid on a school building is $78,265. When one wing is omitted to cut costs, he is able to cut his bid by $16,228. What is his new figure?

3.

If a bundle of rock lath weighs 35 lbs. and it is permissible to place 700 lbs. on any one area on a floor, how many bundles can be placed on any one area?

If 5 lbs. of putty are required to install one light of glass, how many lights can be installed with 85 lbs.?

4.

The improper fraction 48/32 expressed as a mixed number is:

The mixed number 4 3/8 expressed as an improper fraction is:

What is the least common denominator for the following group of fractions: 1/8, 1/2, 1/4, and 1/12?

What is the sum of the following fractions: 7/8, 3/4, and 9/16?

If 3/4 is subtracted from 11/12, the difference is:

The sum of 1 5/8, 2 11/64, and 19 1/4 is:

5.

One roof is 1/3 larger in area than another. The smaller roof takes 24 squares of roofing material. How many squares of roofing material will the larger roof take?

One-third of a box of glass is needed to glaze the north elevation of a building; 2/3 of a box is needed to glaze the south elevation; 1/16 of a box is needed to glaze the east elevation; and 1/2 of a box is needed to glaze the west elevation. How many boxes are needed to glaze all four elevations?

From a bundle containing 101 linear feet of molding, a cabinetmaker uses the following amounts: 11 1/3', 8 3/4', 12 1/8', and 9 5/8'. How many linear feet of molding does he use in all?

6.

The product of 1/2 X 7/8 is:

The quotient of 1/4 ÷ 1/3 is:

If a roll of carpet weighs 467 1/2 lbs. and a running foot of the carpet weighs 2 1/8 lbs., how many running feet are in the roll?

A piece of pipe must be cut to 3/8 the length of another pipe, which is 9' long. How long a piece must be cut?

7.

Write each of the following as decimals.

Seven tenths

Sixteen hundredths

Fifteen thousandths

Elevcn ten-thousandths

Two thousand one hundred fifty-two thousandths

Convert each of the following measurements to feet in decimals.

4' 6"

2' 4 1/4"

A house with a floor area of 1,860 sq. ft. is estimated to cost $18,042. What is the cost per square foot?

A stack of plastic sheets measures 2.28" thick, and it is known that the sheets average 0.06" in thickness. How many sheets are in the stack?

8.

The labor cost for the concrete work for a house was $248. The material cost $210. What percent of the total cost of the concrete work was for material?

An architect indicates a 1/8" = 1'0" scale in the drawing of a swimming pool. What is this scale expressed as a ratio?

On a tile job in which fireclay is to be used, a tilesetter tells his helper to mix mortar according to the following formula: 6 buckets of river sand, 1 bucket of fireclay, and 2 buckets of cement. What is the ratio of sand to fireclay in the mixture?

9.

Divide 19' 2" by 3' 10".

How many pieces of 2' 3"-wide gypsum lath will be needed to cover a wall 48' 6" long?

10.

What is the perimeter of a room 20' wide and 30' long?

What is the area, in square feet, of a floor 42' by 42'?

How many cubic yards of dirt have been removed for the basement and foundations of a house if the excavation is 35' long, 35' wide, and averages 5' deep?

The area of a circular putting green with a radius of 17' is how many square feet?

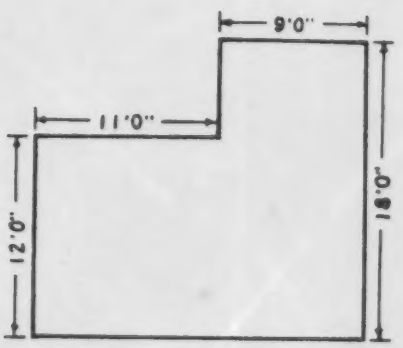
What is the area of a circular floor with a diameter of 10' 6", to the nearest square foot?

What is the area, in square inches, of an acute triangle with a base of 8 1/2' and an altitude of 11 1/4"?

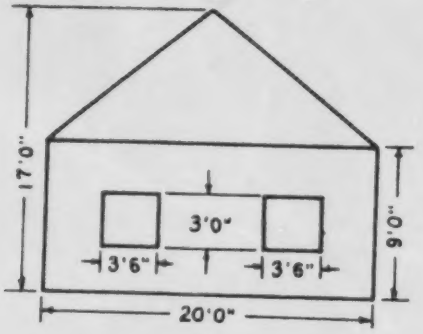
What is the area in square feet, of the floor shown below?

How many cubic yards of concrete will be needed for the foundation walls and footings in the plan below if the walls are 6" thick and 18" deep, and if the footings (shown in dotted lines) will require 2 5/27 cu. yd. of concrete?

1. 6
2. 6 2/3
3. 7
4. 7 1/6



What is the total area, in square feet, of the exterior wall and gable shown below, excluding window areas?



11. Metrics

3 inches	=	cm
5.4 inches	=	cm
7 feet	=	m
3.2 feet	=	m
6.5 yards	=	m
15.3 m	=	inches
12.7 cm	=	inches
50.8 mm	=	inches

5.0 Physical Requirements/Painting

INSTRUCTIONAL OUTCOMES: The student will demonstrate knowledge of physical requirements of the trade and the processes of physical development.

INTRODUCTION: The trade requires certain physical skills and abilities of the worker. It is necessary that the student be aware of the physical demands of the trade and understand factors of physical development.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
5.1 Physical Requirements A. Strength 1. Lifting. a. equipment and materials weighing 20 to 50 lbs. (e.g. paint, ladders, scaffolding). 2. Carrying a. equipment and materials weighing 10 to 50 lbs. (e.g. paint buckets) 3. Pushing. a. equipment and materials requiring 10 to 20 lbs. to push (e.g. furniture to be moved).	On-site visit or classroom simulation. A. Demonstrate B. Lead discussion or question on job site C. Discuss proper technique D. Administer work sheet

4. Pulling.
    a. material and equipment requiring 10 to 20 lbs. to pull (e.g. moving equipment from a wall).

B. Balance
    1. Climbing.
        a. ladders.
        b. Scaffolding.
    2. Balancing.
        a. on scaffolding.
        b. on ladder.

C. Body Dexterity
    1. Stooping.
        a. bending to put brush into paint bucket.
    2. Kneeling.
        a. painting baseboard.
    3. Crouching.
        a. reaching low spots on walls.
    4. Standing.
        a. principle painting position.

D. Manual Dexterity
    1. Reaching above shoulder.
        a. painting top portions of walls and ceilings.
    2. Reaching below shoulder.
        a. painting lower portions of walls.
    3. Handling.
        a. holding equipment (e.g. paint brushes).
    4. Feeling.
        a. surfaces, for texture or blemishes.

E. Talking
   1. Normal communication.

F. Hearing
   1. Normal communication.

G. Vision
   1. Normal vision (correctable).
      a. moving about jobsite.
   2. Acuity near.
      a. detecting small surface imperfections.
   3. Acuity far.
      a. observing overall job for continuity.
   4. Depth perception.
      a. personal safety while on equipment (e.g. scaffolding and ladders).
   5. Color vision.
      a. matching colors of paint.
   6. Field of vision.
      a. awareness of people and equipment beside you.

H. Coordination.
   1. Hand-arm.
      a. using paint brush.
   2. Foot-leg.
      a. climbing a ladder.
   3. Eye-hand-foot.
      a. climbing or standing on ladder with equipment.

PHYSICAL ACTIVITIES PRESENT IN THE TRADE: REQUIREMENTS (to be completed by student)

STRENGTH	Weight	Frequency	BODY DEXTERITY	Degree of Activ.	Frequency	MANUAL DEXTERITY	Degree of Activ.	Frequency
Lifting			Stooping			Reaching-above shoulder		
Carrying			Kneeling			Reaching-below shoulder		
Pushing			Crouching			Handling		
Pulling			Crawling			Fingering		
BALANCE	**Need**	**Frequency**	Standing			Feeling		
Climbing			Sitting			TALKING (speech)		Frequency
Balancing			Walking			**HEARING**	**Acuity**	**Range**
			Reclining					
VISION	**Need**	**Frequency**	VISION (Cont'd)			**COORDINATION**	**Degree**	**Frequency**
Normal vision						Hand-arm		
Acuity-near			Color vision			Foot-leg		
Acuity-far			Field of vision			Eye-Hand-Foot		
Depth perception								

5.2 Individual Developmental Processes A. Maturation 1. Causes physical changes in height and body proportion. 2. Causes emotional changes. 3. A gradual process. 4. Fluctuates from person to person. B. Nutrition 1. Vital to normal growth and development. 2. Essential food groups. a. dairy products. b. meat. c. vegetables and fruits. d. bread and cereals. C. Personal Care and Exercise 1. Good grooming habits. 2. Sufficient sleep and relaxation. a. fatigue increases chances for accidents. 3. Hobbies. a. source of relaxation, help to maintain good attitude. 4. Daily exercise. a. stimulates interest. b. relieves stress. D. Substance Abuse 1. Marijuana. a. affects nervous system. b. affects thinking, judgment and coordination. c. long-term effects unknown.	ILS Physical Development Explanation and Discussion Invite Specialist

2. LSD. a. affects chemical level in brain. b. produces bizarre mental reactions. 3. Barbiturates. a. one of most commonly abused drugs. b. slow responses. c. physically addicting. d. long-term use causes personality disorders. 4. Amphetamines. a. affect central nervous system. b. commonly abused. c. cause psychological dependence. d. dull emotions and impair ability to make decisions. 5. Alcohol. a. psychologically addicting.	
E. Meeting Various Trade Requirements 1. Recognize and prepare. a. natural maturation processes may play role. b. exercise will play role.	On-job-site visitations and consultation with occupational therapist.

6.0 Safety

INSTRUCTIONAL OUTCOMES: The student will be able to identify those hazards, acts and conditions which affect safety on the job and will be able to identify ways to avoid or correct them.

INTRODUCTION: A good worker is a safe worker; injury affects production, as well as the ability of a person to earn a living.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
6.1 General Safety A. Average--over 14,000 employees killed each of past several years. 1. From 1960 to 1970 over 150,000 fatalities. 2. Cost, excluding property damage, $11.5 billion. 3. 50 million employee days lost in 1972. B. Accidents 1. An unplanned and unforeseen occurrence that interferes with or interrupts orderly progress of activity.	Explain, Discuss and Demonstrate Where Appropriate ILS General Safety

2. Should be analyzed to determine why and how happened.
    a. unsafe conditions; poor or defective equipment, poor housekeeping, inadequate lighting.
    b. unsafe acts; loose-fitting clothing; horseplay, removing guards.

C. OSHA
1. Williams-Steiger Occupational Safety and Health Act, 1970.
2. Requires employers to provide safe conditions.
3. Requires employees to comply.
4. Covers about 60-million people; excludes federal employees.

6.2 Personal Safety

A. Safety Consciousness
1. Be aware of good safety practices.
    a. learn the rules.

B. Safety Awareness
1. Put safety consciousness to use.
    a. obey the rules.

C. Head Protection
1. 130,000 head injuries in 1976.
2. Wear clean, adjustable hard hat.

D. Eye and Face Protection
1. 1,000 eye injuries each day.
2. Wear safety glasses, goggles, masks; shields if near harsh chemicals.
3. Wear safety glasses under shields.

NLS Occupational Safety--Personal Safety

E. Hearing Protection
   1. Ear inserts lower high frequency.
   2. Ear muffs lower low frequency.

F. Lung Protection
   1. Mechanical filters protect against non-toxic dust.
   2. Chemical-cartridge types protect against low concentration of some vapors.
   3. Gas masks protect against organic vapers and toxic gases for limited time.
   4. Supplied-air respirators protect against high concentrations of gases and fumes.
   5. Self-contained breathing apparatus protects against high concentrations of gases, vapors, dusts, etc.
   6. Air line respirators protect against high concentrations of dusts, fumes, mists, and low concentrations of gases.
   7. Select proper one for each job.

G. Hand Protection
   1. Average of over 1,300 disabling hand and finger injuries each day in 1976.
   2. Gloves.
      a. asbestos protects against thermal burns, hot or cold.
      b. metal mesh protects against cuts and sharp objects.
      c. rubber protects against electrical and chemical burns.

d. neoprene and vinyl protect against chemicals.
e. leather protects against rough objects, heat and sparks.
f. fabric protects against dirt, abrasions, slivers.
g. coated fabrics protect against chemicals.

3. Creams also used.

H. Foot Protection

1. Over 200,000 disabling foot and toe injuries each year.
2. Wear leather steel-toed safety shoes or boots.

6.3 Fire Types and Prevention

ILS Fire Types and Prevention

A. Fire Types

1. "Class A" of wood, cloth, paper.
2. "Class B" of liquids and gases, paint, grease.
3. "Class C" of energized electrical equipment.
4. "Class D" of metals or metallic dusts.

B. Methods of Extinguishing

1. Absorb heat--add water.
2. Smother--add dry chemicals, foam.
3. Remove fuel--shut off supply.

C. Fighting Classes of Fires

1. Class A
   a. water to cool heat.

2. Class B.
   a. CO_2, powder to smother fire.
3. Class C.
   a. non-conducting agent.
   b. attempt to de-energize.
4. Class D.
   a. special extinguishing agent for types of metals.

6.4 Hygiene Safety

A. Exposure to Toxic Materials
   1. Can create health hazards.
   2. Internal exposure.
      a. breathing contaminants.
      b. swallowing contaminants.
      c. absorption through skin.
   3. External exposure.
      a. contact with skin.
      b. can affect senses.

B. Noise Pollution
   1. Measured in decibels.
   2. Can affect hearing over period of time.
   3. Affects other parts of body.
      a. changes size of blood vessels, makes heart work faster.
      b. produces headaches.
      c. negatively affects nerves, decreases powers of judgment.

/: ILS Occupational Safety--Hygiene Safety

C. Airborne Contaminants 1. Dusts; particles generated mechanically. a. can affect skin, eyes, lungs. 2. Fumes; solid particles of condensation process. a. common fumes caused by oxidation of metal. 3. Mists; particles of liquids or liquids and solids. 4. Gases; low density, change to liquids or solids. 5. Vapors; gases normally in solid or liquid state at room temperature. 6. Contaminants may affect body in four ways. a. as irritants to lungs. b. as asphyxiants, prevent blood from normal transfer of oxygen. c. as anesthetics or narcotics, cause drowsiness and nausea. d. as systemic poisons, attack vital organs.	
6.5 Hand Tool Safety A. Hammers 1. Face should be 3/8" larger in diameter than object. 2. Strike object squarely and flatly. 3. Replace damaged handles before use. 4. Don't strike wood- or plastic-handled chisels. 5. Don't pound with cheek (side) of hammer.	ILS Occupational Safety--Hand Tools

6. Don't pound sharp objects with mallets

B. Chisels, Punches, Nail Sets
   1. Be sure tools are ground at proper angles.
   2. Remove mushroomed heads.
   3. Hold tools with tongs if being struck by another worker.

C. Screwdrivers
   1. Select correct size and tip style.
   2. Don't pound on screwdrivers.
   3. Don't put hands and fingers under work.
   4. Don't use screwdrivers to pry.
   5. Use appropriate wrench on square-shank screwdriver.
   6. Use magnetized screwdriver to start screws in awkward places.
   7. Use non-sparking screwdrivers if working near explosive hazard.
   8. Use insulated screwdrivers when working on electrical devices.
   9. Don't use screwdriver for electrical testing.

D. Wrenches
   1. Select correct type for job.
   2. Select correct size for snug fit.
   3. Don't use cheater bars.
   4. When using adjustable wrenches, always pull, always against fixed jaw.
   5. Be sure wrench fits squarely, not tilted.
   6. Don't pound with a wrench.

7. Use penetrating oil on "frozen" objects.

E. Pliers
   1. Select correct size and type.
   2. Don't use cheater.
   3. Excessive heat will draw temper from metal.
   4. Don't pound with pliers.
   5. Cutting pliers.
      a. cut at right angle to wire.
      b. point open side down so cut end will not fly out.
   6. Use pliers with high dielectric insulation when working on electrical devices.
   7. Keep jaws clean.

F. Vises
   1. Work as close to vise as possible.
   2. Clamp objects in middle of jaws.
   3. Don't use cheater bar.
   4. Use adequate-sized vise.
   5. Support far end(s) of long work to avoid putting excess strain on vise.

G. Clamping Tools
   1. Select correct size and type.
   2. Keep moving parts clean and lightly-oiled.
   3. Don't over-tighten.
   4. Don't use cheater.
   5. Don't use for hoisting materials.

H. Saws

1. Select correct size and type.
2. Maintain sharpness.
3. Check material before sawing.
4. Use sawhorse or bench, not knee, when sawing.
5. Make sure handle is clean and tight.
6. Be aware of hand, finger and leg position before sawing.
7. Hacksaw teeth should point away from handle to saw on push stroke.
8. Wear gloves when sawing metal.

I. Snips, Shears

1. Select correct size and type.
2. Keep blades sharp.
3. Do not cut wire.
4. Use only hand pressure.
5. Wear gloves.

J. Files, Rasps

1. Select proper size and type.
2. Don't use wood file or rasp on metal.
3. Cut on forward stroke.
4. Keep teeth clean.
5. Use proper sized handles.
6. Don't use to pry.

6.6 Power Tools

A. Circular Saws

1. Operate only with fixed guard on upper half of blade and flexible guard on lower half; don't tamper with guards.

ILS Occupational Safety--Power Tools

2. Blade should clear material by maximum 1/8".
3. Operate by not forcing; forward motion only.
4. Check material for nails, grit, etc.; support material so it doesn't bind.
5. Allow blade to come to full speed before cutting; prevents kickback.
6. Make sure lower guard has returned before setting down.
7. Clean sawdust from lower guard often.

B. Sabre Saws
1. Select proper blade for material.
2. Feed blade slowly.
3. Hold saw base against material.

C. Pneumatic Tools
1. Secure all hoses.
2. Clean with compressed air only if less than 30 PSI with guard.
3. Hoses over 1/2" diameter must have safety valve at source.
4. Hose couplings must have safety connection.
5. Nailers should have device to prevent ejecting when not in contact with work.
6. Point tools toward floor when carrying.
7. Shut down, turn off air supply, bleed line.
8. Wear safety equipment, goggles, shields, etc.

D. Hydraulic Power Tools

1. Fluid used must be fire-resistant and approved by U.S. Bureau of Mines.
2. Don't exceed manufacturer's pressure recommendations.
3. Don't touch stream of fluid from leak.

E. Compressors

1. Storage tanks must be approved by American Society of Mechanical Engineers.
2. Drain condensed water daily.
3. Tanks must have safety relief valve.
4. Pressure gauge must be maintained accurately.

F. Powder-Actuated Tools.

1. Test before loading each day.
2. Load just before using.
3. Wear hearing, eye protection.
4. Don't point at anyone; keep hands away from barrel end.
5. Leave protective guards in place.
6. Must have safety device to prevent accidental firing, and to prevent firing if tilted.
7. Don't operate near combustion hazard.
8. Should only be operated by trained and qualified personnel.
9. Return tool to case after use.
10. Don't drive fasteners into extremely hard or brittle materials.

7.0 First Aid

INSTRUCTIONAL OUTCOMES: The student will successfully complete an eight-hour multi-media first aid class, taught by a qualified instructor, and will obtain a First Aid Card.

INTRODUCTION: Persons employed in any occupation, especially those occupations which deal with power and hand tools, encounter situations when first aid may be necessary to prevent an injury from becoming more serious. A first aid course, successfully completed, prepares individuals to cope with many of those situations.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
7.1 First Aid A. Eight-hour multi-media course, or equivalent, offered by: 1. Red Cross 2. Medical Services, Inc. 3. Police Department 4. Fire Department 5. Other service and health organizations.	Administer course

8.0 Blueprint Reading

INSTRUCTIONAL OUTCOMES: The student will be able to identify and use the concepts of working drawings and their components: scaling and dimensioning, sketching, orthographic, pictorial and isometric projections, as well as construction symbols commonly found in blueprints.

INTRODUCTION: A skilled worker must understand the language of blueprints to advance in any trade where prints are used.

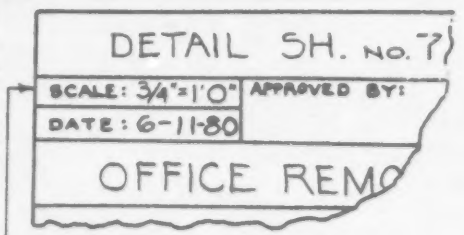
PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS

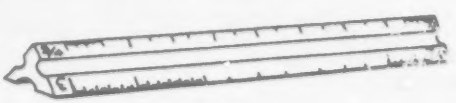
8.1 Scaling and Dimensioning

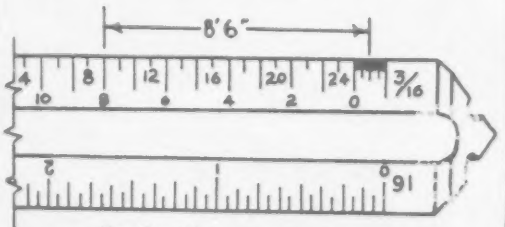
A. Scale

1. The ratio of drawing dimensions to object dimensions.
2. Always indicated on drawing.
3. Vary, depending on size of paper and detail to be shown.
4. Measured by architect's scale, engineer's scale, draftperson's scale.
5. Technique of measurement: architect's scale is placed on drawing, read in marked increments.



Scale as Shown

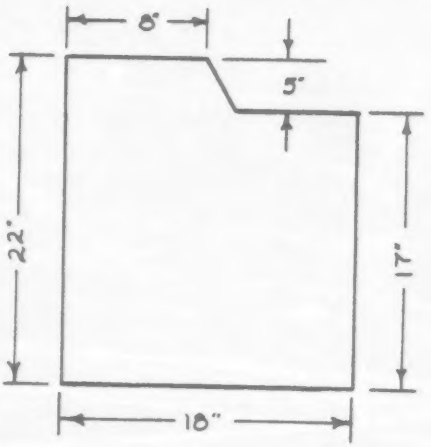

Architect's Scale



Scale Measurement

B. Dimensions

1. Are size descriptions for drawn objects.
2. Located on working drawings by:
   a. dimension lines--indicate distance between two points (usually between two extension lines); contain dots or arrows at ends.
   b. extension lines--mark the beginning and end of distance.
3. Placed in orderly fashion on drawing.



Dimensions

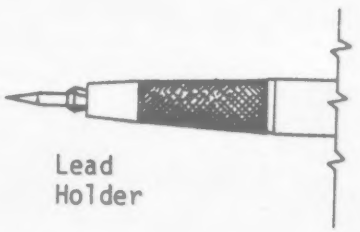
8.2 Sketching

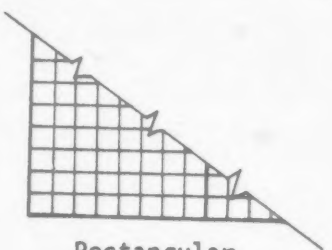
A. Uses

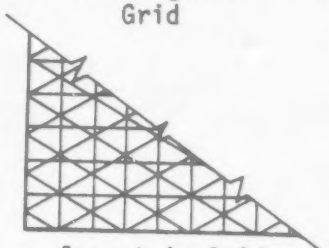
1. For conveying rough ideas or organizing ideas.
2. For details, developed from existing drawing.

B. Materials

1. Pencil, soft lead.
2. Eraser, gum.
3. Paper, coordinate.
   a. rectangular grid
   b. isometric grid


Lead Holder


Rectangular Grid


Isometric Grid

C. Size, Proportions

1. Generally not drawn to scale, but should remain proportionately accurate.

D. Procedures

1. Determine overall size of object.
2. Create short lines by one firm, quick stroke.
   a. go through motion of stroke with pencil removed from paper.
   b. pencil point on paper entire time.

E. Basic Forms

1. Squares, rectangles, triangles, circles.
2. Layout crosses (intersecting lines) to provide reference points for drawing.
3. Circles and arcs sketched with little finger of drawing hand as pivot; move paper, not hand.

8.3 Drawing Types and Views

A. Orthographic Projection

1. Called orthograpic drawings or "true" drawings, also "three-view" or "multiview."
2. Almost universally used in architect and engineer drawings.
3. Drawn to scale.
4. Each view shows one face or side of object as seen from square view.
5. Possible to indicate true size, shape and location of all object parts, and dimension clearly.

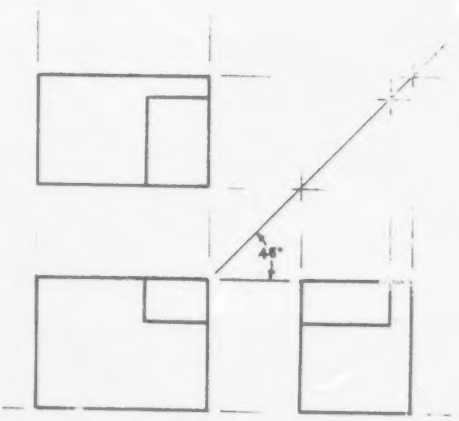
Explain and Discuss;

All References made to:

ILS Scaling and Dimensioning

ILS Sketching

ILS Types of Drawings and Views

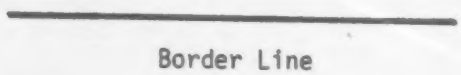


Orthographic Drawing

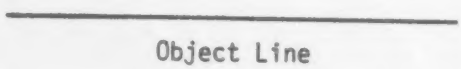
6. Each view is 90^{0} rotation of other view.
7. All related views must be studied together to visualize object shape.

B. Types of Lines

1. Border Line.
   a. a thick, solid black line (blue).
   b. shows geographical or space borders.
2. Visible object line.
   a. a thinner solid black line (blue).
   b. shows visible edges of object.
3. Hidden object line.
   a. a line of equidistant and equal length dashes.
   b. shows edges of important elements hidden from view.
4. Section line.
   a. a thick, broken line with arrows turned at 90^{0} angle.
   b. delineates sections of object represented.
5. Center line.
   a. a thin line of alternately long and short dashes.
   b. shows centers of objects (doorways, e.g.) and relationship with given dimensions.



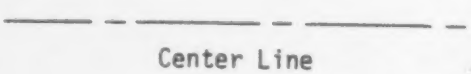
Border Line



Object Line

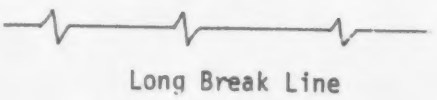
Hidden Object Line

Section Line

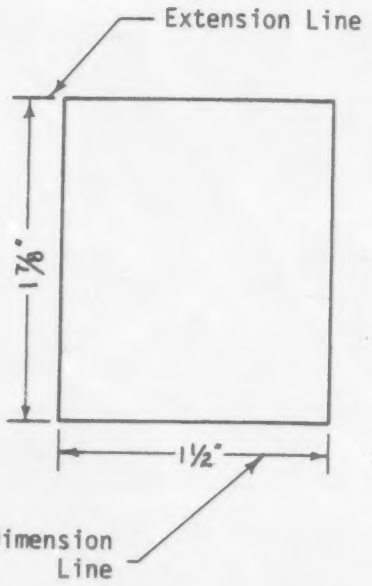


Center Line

6. Long break line.
   a. a thin solid line, straight, with occasional zig-zags.
   b. indicates a break in object.
7. Extension line.
   a. a short thin line, drawn perpendicular to dimension line.
   b. shows beginning and ending point of measurement; lines are extensions of object or part.
8. Dimension line.
   a. a long thin line, with dots or arrows on each end, broken in middle for numbers.
   b. touch extension lines and give measurement from one extension line to another.



Long Break Line



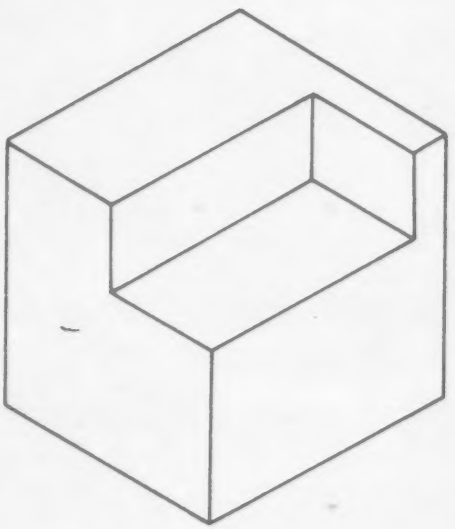
C. Pictorial Drawing
   1. Shows more than one face of object.
   2. Advantage: easier for lay person to understand.
   3. Disadvantage: distorted object lines and angles.
   4. Useful to give "completed" look renderings.

D. Axonometric Drawing

1. A type of pictorial drawing.
2. Three principle axes used.
3. Can represent any object by changing viewpoint.
4. Isometric position is principle one used.

E. Isometric Drawings

1. Viewed from exact position in which three of sides are equally foreshortened.
2. Three axes: one axis vertical and otner two at 30^{o} from horizontal base.
3. Will appear in true proportion.
4. Will not appear in true scale lengths.



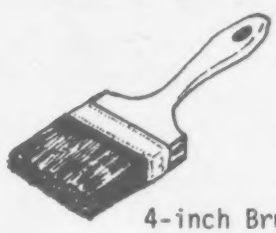
Isometric Drawing

9.0 Trade Tools/Painter

INSTRUCTIONAL OUTCOMES: The student will be able to identify, select and explain the uses of common tools of the trade.

INTRODUCTION: A painter works more efficiently and professionally using the proper tool or tools for a given task.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
9.1 General Tools A. Brushes 1. Types a. natural bristle brushes are usually used only with oil-based paints. b. nylon brushes may be used either with oil-based or water-based paints. c. several categories on basis of use and type of surface to be painted. d. for large surfaces, both inside and outside, wall brushes from 3" to 6" wide are used.	Explain and Discuss Invite Supplier to Demonstrate See Brushwell op.cit.  4-inch Brush Sash Brush

e. for trim work, such as window sash and mouldings, flat, oval, or angular brushes in widths from 1" to 3½" are used.

f. for calcimine or other water-based finishes, brushes from 5" to 8" wide, with longer bristles, are used.

g. brushes for enamel and varnishes range from 2" to 3½" wide, have longer and finer bristles, may be chisel cut and/or a little heavier in the center to aid in producing a smooth finish.

h. other kinds of brushes include stippling, roofing, dry dusting, and heavier wire brushes for surface preparation.

2. Application

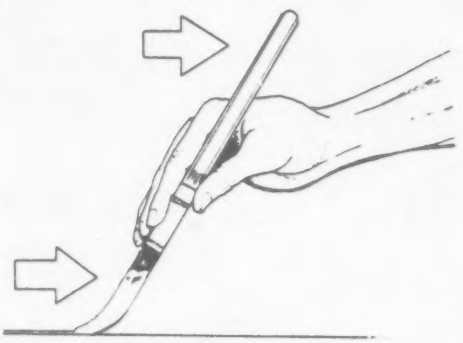
a. for most applications, brush is held at a slant in the direction of travel.

b. proper pressure applied so that paint is leveled out by brush with minimum of ridging or brush marks.

c. usually brush into new paint rather than onto dry surface to avoid "lap" marks.

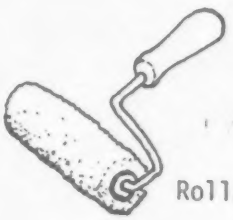
d. on ceilings, paint in direction of light source to minimize shadow of brush marks.

e. to "load" brush, dip about half bristle length and tap (not wipe) off excess paint.

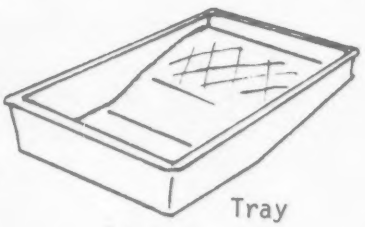


B. Rollers

1. Characteristics
   a. cover large areas quickly; easily used with extension handles for places hard to reach with a brush.
   b. "nap" on rollers varies in length; longer naps used on rougher surfaces, or for various decorative effects.
2. Application
   a. to load roller, roll it into shallow part of paint tray, out of paint and across ridges to distribute paint; repeat several times.
   b. work quickly to keep a wet edge on new paint; to prevent lap marks.



Roller



Tray

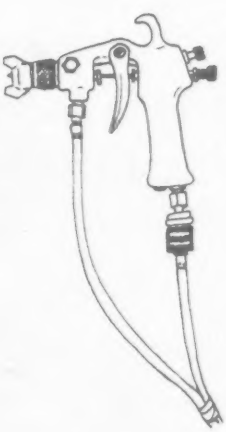
C. Pads

1. Combine advantages of both brush and roller; allow worker to cover a lot of surface quickly.
2. Care is needed to prevent dripping.
3. Used chiefly with finish coats of various paints.

Painting Pad

D. Spray Guns and Airless Paint Guns

1. Employ power from motor or engine at the press of a trigger; offer much faster painting and advantage in covering irregular surfaces.
2. Spray guns
   a. mix air with paint, project mixture onto surface.
   b. feeder guns used with heavier materials, i.e. barn paint and floor enamel.



Air Spray Gun

c. suction guns generally better where many color changes are required.

d. self-contained, electric guns, combining paint container with diaphragm pump and gun, used where high portability is a factor.

e. generally used only outside or on interior of new structures where there is adequate time to ventilate, and cover surfaces not to be painted.

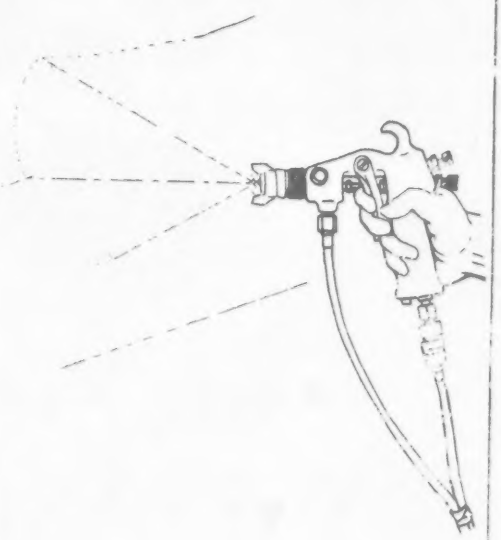
f. proper distance between gun and the work, best timing for using trigger and right balance between paint and air vary with paint, type of surface, drying conditions.

(1) general technique developed around method for spraying flat panel.

(2) top edge is sprayed first, with center of spray pattern aimed at edge.

(3) trigger is pressed just as gun tracks horizontally across edge, held down. As gun is moved laterally across surface to opposite edge, where it is released just as spray pattern crosses edge.

(4) gun is moved in the other direction with center of spray pattern at bottom edge of previously painted strip.



(5) varied as one works around corners and edges of surface; edges and corners are painted first, remaining surface painted as a panel.

3. Airless guns
   a. employ pump to force paint through tip at high pressure.
   b. are about twice as fast as spray gun.

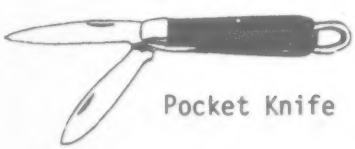
E. Knives and Scrapers
   1. Blade tools, used mostly for preparation of surfaces.
   2. Various widths of "putty" knives.
      a. used to remove dirt, deteriorated paint and other foreign materials that may prevent a smooth and continuous coating of surface.
      b. some are pulled across surface to shave and scrape; often have replaceable blades.
   3. Conventional straight putty knife.
      a. used to clean out cracks and tight corners.
      b. for applying and cleaning up excess crack fillers, putty, caulking, or spackle paste.
   4. Sharp knife to use with ropes, spatter cloths, to trim various materials, to smooth off rough surface where scraper isn't convenient or satisfactory.

Scraper

Wire Brush

Putty Knife

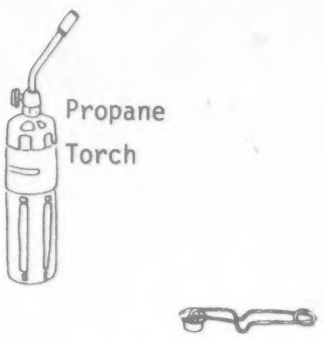
Utility Knife



Pocket Knife

F. Torches

1. Used to soften old paint so that it can be removed with scraper or putty knife.
2. Old fashioned blowtorch.
   a. uses gasoline, pressurized with air; equipped with pump that is used to pressurize fuel tank.
   b. small, open reservoir just under discharge port of torch is filled with small amount of fuel and lighted to heat up port and its generator.
   c. fuel from main tank is valved into generator; resulting spray of fuel mixed with air is lighted manually.
3. Recently developed torches.
   a. burn liquified petroleum or butane, or in some cases acetylene.
   b. supplied with pre-packaged fuel canisters.
4. Operated in complete absence of flammable fumes or sprays.



Propane Torch

G. Sandpapers and Abrasives

1. Usually necessary to produce surface that is clean, smooth, yet rough enough to provide right "tooth" so that paint will adhere.
2. Sandpapers
   a. usually in sheets 9" by 11" for hand use with sanding block or stick; also manufactured in belts and discs for various electric sanders.

b. variety of abrasives used.
   (1) silicon carbide, garnet, emery, aluminum oxide, and "flint" (actually quartz).
c. grit size and density on sanding surface is indicated by one of several numbering systems:
   (1) silicon carbide and aluminum oxide: numbers range from 16 to 500; higher numbers indicate finer, denser grit.
   (2) "flint" and emery grits: numbering system ranges from 3 to 1 for coarse grits, 3 is the coarsest; from 1 to 4/0 for the fine grits, 1 is the coarsest.
   (3) garnet papers cover narrower range: from 20 to 280, using same system as for silicon carbide and aluminum oxide.
d. finer grades sometimes used in waterproof form for wet sanding lead-based paints and other applications; produce especially smooth surface.
e. pumice (in grades from 4-F, fine, to No. 7, coarse) can also be used with water or oil for glossy finish to priming paint, or old paint
f. rottenstone, a type of limestone, used similarly.
g. steel wool often used to get fine surface on irregular projections or mouldings; available in degrees from finest, 3/0 to coarsest, No. 5.

H. Caulking Gun

1. Usually built to accept pre-packaged cartridge of caulking material; enables painter to easily switch types.

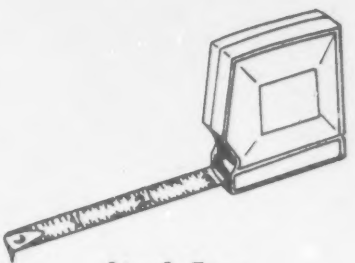
I. Chalk line

1. Consists of chalk reservoir and reel or spool on which line is wound.
2. Chalk is taken up and carried out onto line when extended.
3. Line is stretched tautly a few inches above surface to be marked; and then "snapped", leaving a straight-line mark.

Chalk Line

J. Tape Measures

1. Made in a wide variety of sizes and materials; those in commercial use include a spring that retrieves tape and equipped with a locking device to prevent accidental retraction.
2. Some painters use dial indicating device that is "run" along line and shows the distance traveled on dial.



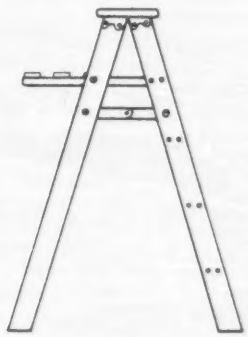
Steel Tape

10.0 Trade Equipment/Painter

INSTRUCTIONAL OUTCOMES: The student will be able to identify, describe and explain the use of commonly-used equipment, and demonstrate ability in its use.

INTRODUCTION: A skilled worker identifies and uses related equipment in a safe manner.

PRESENTATION

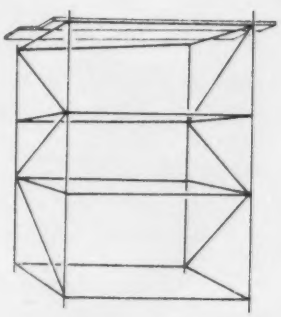
TEACHING OUTLINE	TEACHING METHODS AND AIDS
10.1 Related Equipment A. Ladders 1. Three major types of ladders: a. the common stepladder is portable, self-supporting, and not adjustable for length; have small platform near top for resting tools or paint temporarily. b. straight ladder and the more versatile extension ladder; must be leaned against a wall or roof.	Explain and Discuss Invite Supplier to Demonstrate See Brushwell op.cit.  Stepladder

c. "trestle" ladder; in appearance, it resembles stepladder, except that both sets of legs, or rails, are equipped with steps; can also be equipped with extension component that is raised vertically, sticking up straight, above apex of two sets of rails.

2. Step and trestle ladders often used with a plank to construct a quick scaffold; not considered safe, especially for inexperienced workers.
3. To raise ladder safely, place its feet on solid, sure surface and "walk" it up, rung by rung, with hands; should not be placed at less than a 75-degree angle with the ground, distance from base of wall to feet should be one-fourth the length of the ladder; move ladder instead of leaning out "just a little bit more."

B. Scaffolding
   1. Temporary platforms to support workers and materials and equipment some distance off the ground.
   2. Erected on the spot from lumber or using pre-manufactured modular systems of components of metal pipe.
   3. For work at greater heights than two or three "stories", suspended and outrigger scaffolds are built.
   4. Initial rigging, inspection and maintenance of any scaffolding structure are for experienced, trained workers only.

5. Due to temporary nature, scaffolds are always inspected carefully by State and local building inspectors to see that proper materials and structural methods are used.
6. Complete specifications for lumber, nails, assembly patterns, and sizes of lumber to be used.
7. 10 feet high, or higher erections, must have railings to protect workers from falling, and toeboards to prevent falling tools and materials.
8. Outrigger scaffold supported by "thrustouts" extending from side of (or the inside of) the building.
9. Suspended, or swing scaffolding is allowed only for maximum of two workers.
   a. scaffold must be of at least 9000 lbs. breaking strength, 3/4" diameter, and welded or forged into place.
   b. for spans of less than 12 feet and heights not over 10 feet, ladders and steel jacks may be used to provide temporary scaffold.
10. Steel scaffolding.
    a. assembled from pre-welded end frames and diagonal bracing fastened together with patented clamps.
    b. erected in accordance with over twenty specific regulations.
    c. often erected by the firm that supplies them on a rental basis to builder or contractor.



C. Ropes and Knots

1. Dry, clean rope of natural hemp or artificial material such as nylon or polypropolene.
2. Used in conjunction with ladders, scaffolding, and drop cloths or tarps.
3. Most often-used knots include the square knot, bowline and tunning bowline, rolling or "taut line" hitch, scaffold hitch, and loop with two half-hitches.

11.0 Materials/Painter

INSTRUCTIONAL OUTCOMES: The student will be able to identify commonly-used trade materials such as paint and other finishes, will read and be tested on the principals of basic color theory, and be able to describe adequately the uses of clean-up materials.

INTRODUCTION: The variety of painted-on finishes, and their ability to protect and preserve various surfaces has been greatly extended in recent years with the addition of artificial materials. Also, industrial painting applications in a production line environment offer new kinds of jobs for the worker who is familiar with painting materials and methods.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
11.1 Trade Materials A. Paint types and characteristics 1. Classified according to materials used in their manufacture. a. emulsion paints. (1) commonly called "latex", are water-based, making both the thinning and clean up of tools and nearby areas easier and cheaper. (2) when mixed with aluminum, completely waterproof, and often used on masonry and roofs; aluminum-pigmented silicone resins are best heat resistent paints known.	Explain and Discuss Invite Supplier to Demonstrate See Brushwell op.cit.

b. oil-based painting materials include topcoats and enamels.
   (1) topcoats may be oil, resin, or water-based; varies by degree to which will be exposed to weather.
   (2) topcoat may be an enamel; varnishes or lacquers are added to paint to create an enamel.
      (a) provides glossy or semi-gloss finish; is harder than that of paint and more able to stand washing.

c. lacquers dry by evaporation of their solvent leaving film on surface. Most are based on nitrocellulose.
   (1) produced for wide variety of specialized applications.
   (2) in damp weather it is sometimes necessary to add slower drying solvent to some lacquers to prevent whitening of material as it dries.

d. epoxy paints resist abrasion, adhere well to concrete, are waterproof, and resist alkali content of soaps and many chemicals.
   (1) used for bathroom fixtures and swimming pools.
   (2) very competitive with spar varnish for marine work because of easy adherence to fiber glass and metal, as well as to wood.

e. metals used as pigments in mixing special purpose paints.

(1) aluminum

(a) "leafing" aluminum pigment in flake form, comes to surface as paint dries, forms film of metal that is almost continuous.

(b) nonleafing aluminum paint dries to gray finish; used to prevent bleeding through of other finishes, to protect against sunlight and to reflect heat.

(2) bronze--usually alloyed with one or more other metals, used in many lacquers for decorative effect; does not have hiding power of aluminum paint.

(3) zinc--often used for priming metal surfaces; mixed on the spot because it may react with moisture in paint to form gas.

(4) lead flake very durable as primer, settles quickly because of high relative weight.

(5) gold used traditionally in form of leaf by sign painters; recent rise in cost will discourage wide use.

B. Principles of Basic Color Theory

1. Color is an effect upon eye by light waves; sensitivity in detecting color differences is very precise.
   a. particular wave lengths of light produced by an interplay between light and surface from which it is reflected.
2. Some 50 color names in everday use; can each be produced in paint shop by mixing combinations of pigments with a base, usually white; 30 such pigments are in common use.
3. Color can modify appearance of architecture; a darker color will "lower" ceiling of room; room painted in lighter colors will appear larger than when painted in darker colors.
4. Subject of color is as detailed and as important as chemistry and properties of materials used in making paints, applying them.

C. Dimensions of Color

1. Identify any color in terms of three properties, or dimensions:
   a. "value" indicates lightness or darkness.
      (1) usually shown on labels and in formulas as a number from 1 (pure black) to 9 (pure white).
      (2) lighter colors have value numbers larger than 5, darker colors have numbers less than 5.

b. "hue" indicates what is usually thought of as color; five major hue names; red, yellow, green, blue, and purple.
   (1) on labels, capitalized letters such as "R" for red, or "YR" for yellow-red, are used to show hue. Think of hues arranged in a circle like a clock face: red at 12 o'clock, yellow at 2 o'clock, green at 5 o'clock, and blue at 8 o'clock. Purple, then, fits in between blue and red, to complete the circle.

c. "chroma" indicates the strenth or purity of hue.
   (1) chroma is thought of in terms of how "far" it is from a gray (of the same value as the hue); chroma #1 is almost pure gray; chroma #14 is a pure hue.

d. a very strong red, such as vermilion, is coded as R 5/12; a rose is coded as R 5/4, showing it to be same hue and value as vermilion, but quite a bit grayer, a less pure (or strong) color.

D. Color Harmony

1. Human eye provides "complementary" hues.
   a. if you stare at pure hue eye will tire of hue, try to change it.
   b. eye will produce appearance of complementary color when shifted to white surface.

c. color and complementary color will be more pronounced and clashy if abutted; produces clash.
d. achieve harmony by using colors with one basic hue in common.
e. stimulating harmony produced by using complementary colors.
f. on most jobs, some prevalent color may dictate paint color.

E. Mixing Pigments
1. Any color can be mixed or matched with no more than four pigments.
a. base color is usually white, two colors may be needed to "bracket" desired hue, a fourth pigment to gray the color to the desired chroma.
2. Color changes in paint as it dries.
a. if pigment is darker than base (almost always), color will darken --become lower in value; in the trade, called "floating."
b. an exception is that yellows will "lean" in direction of red; more noticeable in emulsion paints which are noted for "losing" yellow.
3. Pigments for oil-based paints usually referred to as "color-in-oil."
a. mix first with a little thinner to get "lump-free" liquid.

4. Try to match colors in situation in which color is to be used.
    a. artificial light, and light reflected from color nearby will affect color.
    b. fluorescent lamps bring out blues, yellows and greens; regular light bulbs bring out reds, (a barn red building as far as three blocks away can turn a soft peach kitchen or bathroom into bright, blushing pink on a clear, sunlit day; soft, powder-blue mixed for a bedroom can be turned into a sea-green by foliage outside).

F. Other Surface Finishes
    1. Stains
        a. actually dyes, soluble in water, alcohol or oil, cover wide range of colors.
        b. will all color coating over them if it is soluble in same solvent.
        c. pigment oil stains (sometimes called wiping stains).
            (1) color and fill wood surface; resist change under light and usually do not raise grain very much.
            (2) length of time they are allowed to dry before wiping and amount of wiping control darkness.

(3) are not quite as clear in finish as some of others are and may not be selected if wood is very fine grained or if desire to get maximum effect from wood's texture.

d. varnish stain

(1) combines coloring and covering processes into one, but will leave a more noticeable "white" spot if chipped; also may be more difficult to attain continuous color because may show a darkening at brush laps or sags that occur while drying.

e. creosote stain

(1) a combination of wood and coal tars, Japan drier (made from varnish gum and metallic salts) and thinned with benzene or kerosene.

(2) used mainly as a preservative on shingles or siding.

(3) has a strong odor that may be beyond control, also can give severe burns.

2. Varnishes

a. relatively clear coating made from resins of trees in a form that is soluble in water or a volatile liquid of some kind.

(1) catalyzed varnish has catalyst added just before use that speeds drying.

b. resist damage by water and many solvents.

c. water varnishes are emulsions or dispersions of resin in water, used by artists to "fix" their work, and in such various production-line applications as making hair dressing products and straw hats.

d. spirit varnishes combine resin with volatile liquid; also used in production work, and in anti-fouling marine paints and in highway paints

e. oleoresinous varnish is type most widely used; combine resin with oil and some kind of drier; great variety of these including varnishes with phenolic, epoxy, asphalt and aluminum.

f. all varnishes must be used in dust-free environment; applied with clean brush.

g. most woods require a sealer, and may or may not be stained before the varnish is applied

   (1) bubbles usually come more from shaking can than from improper brush technique; the latter is important in getting a uniform coating and in avoiding crossing the grain of the wood.

   (2) first coat of varnish can be sanded with 6/0 wet sandpaper and rubbed if desired. Pumice, used with oil, followed with a rubbing with rottenstone, is process for finishing the final coat of varnish.

(3) varnishes may be sprayed but are usually thinned considerably.

3. Shellac
   a. a resin but of a type soluble in alcohol.
   b. very widely used to seal off bleeding stain and knots in wood.
   c. water spots easily; often used as a sealer or prime coat on wood.
      (1) usually thinned somewhat with alcohol, depending on job.
      (2) fast speed of drying; requires practiced brush work to avoid lap marks and uneven buildup.
      (3) makes good sealer and undercoat, applied in two or three coatings with sanding of each, on surfaces of wood that are to be waxed.
         (a) wax on bare wood catches dirt and is very hard to remove.

4. Urethanes
   a. cure in contact with moisture in air; not used in very dry conditions.
   b. very resistant to many solvents, including water; vulnerable to ultraviolet light and usually require a properly primed surface for good adhesion.

c. synthetic-resin finishes, used mostly in maintenance work, include chlorinated rubber, vinyl resins, silicone resins, and catalyzed phenolic coatings; relatively new, have greatly extended range of materials used by painters.

G. Preparation and Patch-up Materials

1. Primers

a. function to seal and adhere to surface; must offer good bonding surface or "tooth" to succeeding coat; should dry to a less flexible, more stable consistency than topcoats; referred to as "fat," the fatter material has a greater oil content, more flexible when dry.

b. if successive coats do not proceed from "lean" to "fat," result is much like thin ice over moving water; will crack or "alligator."

c. new type of primer, phenolic-resin primer-sealer, often selected for soft woods; equalizes hardness of surface across hard and soft grain of woods.

d. vinyl emulsions recommended as primer for masonry and stucco; metal primers include red and blue lead, zinc chromate, and iron oxide.

2. Solvents and thinners
   a. used to reduce heaviness or thickness of finishes and to clean tools and areas not requiring paint; are as different as finishes themselves and must be correctly selected.
   b. thinner other than alcohol will ruin shellac.
   c. pine derivatives are used mostly with oil-based paints.
      (1) include turpentine, dipentine and pine oil.
   d. spirits of petroleum.
      (1) includes naptha, in several forms, mineral spirits, kerosene, ethyl alcohol and methyl alcohol.
   e. lacquer solvents include toluol (toluene), xylol, acetone, benzol, ethyl acetate and amyl acetate (banana oil).
   f. choose correct material (many paints work fine without any thinning).
      (1) house paint may need thinning for use on new or weathered wood.
      (2) thinning may be needed for spray painting.
      (3) sometimes, if paint has been stored, both oil and thinner may be needed.
      (4) resin, rubber, casein and some texture paints must be thinned with water.

3. Catalysts
   a. chemicals that have an activating effect on other materials; most common example is epoxy glue kits widely used for repairing china, etc. The epoxy finishes work the same way, and catalyst is required for some phenolic coatings.
4. Sealers
   a. shellac, varnish, lacquer and synthetics.
   b. used to fill pores of wood and as a base for succeeding coatings.
   c. brush differs from that with paint; short strokes in all directions to avoid lap marks and to work material into surface texture.
   d. shellac and varnish, a thinned version of the finish works well as sealer.
   e. lacquers; sealer coat is even more important.
   f. all sealers should be sanded with care to not cut through sealing coat.
   g. sealing new plaster must provide non-absorbing base for finish coatings.
      (1) some resin paints can be used for sealing and priming as well as for finishing.

5. Pentachlorophenol
   a. one of best preservatives against rot, termites and powder post beetles.
      (1) ingredient in many wood-preserving solutions that are also water repellent.
   b. on existing structures, may be brushed or sprayed on surfaces that have been cleaned and from which old paint has been removed.
   c. new construction, dip materials before they are built into a structure.
   d. safety precautions against skin and eye and respiratory contact are mandatory.
6. Putty--caulking material
   a. required on almost every job to fill cracks, cover imperfections in materials, and to fill cracks between edges of assembled construction components.
   b. putty is usually made from white lead, whiting, linseed oil and perhaps an additional oil to slow drying.
   c. spackling putty or "compound" may have glue added, and be formulated to make it more smooth when sanded.
   d. wide range of caulking compounds.
      (1) all are prepared with various ingredients that cause them to be very slow to dry completely; lets them move with crack edges and crevices where they are chiefly used.

(2) compounds available in cartridges for use with caulking gun; in tubes and cans for application with putty knife; in paper-wrapped strips.

(3) different formulas for tile, wood, sheet metal, glass, porcelin, etc.

SUGGESTED READING

1. Brushwell, W.
Goodheart-Wilcox's Painting and Decorating Encyclopedia

2. Painting and Decorating Contractors of America
Painting and Decorating Craftsman's Manual and Textbook 5th ed.

Painting and Decorating Contractors of Americal, 1975

12.0 Applied Painting Techniques

INSTRUCTIONAL OUTCOMES: Student will demonstrate and execute basic trade skills by completing a project to the satisfaction of the instructor.

INTRODUCTION: This instructional unit provides students an opportunity to practice techniques followed in the Pacific Northwest; appropriate techniques will have been learned in previous topics in this guide.

PRESENTATION

TEACHING OUTLINE	TEACHING METHODS AND AIDS
12.1 Painting Surfaces A. Layout 1. Inspect site to assure it is ready to be painted. 2. Determine size of area to be covered. a. a reasonable estimate is needed to determine materials required. 3. Select paint for job. a. select proper type for surface being covered. b. select color appropriate for location. c. determine quantity required for area to be painted with manufacturers coverage figures.	Explain and Discuss Administer Project Sheet

B. Site Preparation
   1. Cover floors, furniture, equipment, etc.
   2. Mask any surfaces not to receive paint.

C. Prepare Surface
   1. Fill cracks, holes, etc.
   2. Sand (if required).
   3. Remove old paint (if required); torch, scrape, sand, etc.

D. Apply Paint
   1. Select proper brush(es) and/or roller(s).
   2. Paint surface.
      a. more than one coat may be required

E. Site clean up
   1. Remove masking material.
   2. Remove covering materials.
   3. Clean up spills, etc.
   4. Clean brushes, rollers and other tools.

PAINTING PROJECT SHEET

1. Painting surfaces.

The student will paint a surface or surfaces, using appropriate techniques and complying with safe tool use, to industry standard.

REQUIREMENTS

A surface or surfaces to be painted or refinished (walls, rooms, etc.).

TOOLS

drop cloths
sandpaper
paint (type depends on surface to be painted)
brushes/rollers (type and size depends on surface to be painted)
clean up solvents and fluids
metal tape measure
pencil

STEPS TO COMPLETION:

1. Inspect site.
2. Determine size of area to be covered.
3. Select type and amount of paint for surfaces to be covered.
4. Prepare surfaces as required.
5. Mask any required areas or surfaces.
6. Cover floors, furniture, equipment, etc.
7. Paint surface; may require more than one coat.
8. Remove masking and coverings.
9. Clean up.

APPENDIX

OCCUPATIONAL ANALYSIS

PAINTER

OCCUPATIONAL ANALYSIS

State Department Code # 09

U.S.O.E. Instructional Group Code: 17.100500

D.O.T. # 840-781-010

PRINCIPAL INVESTIGATORS

State Department Specialist: RALPH LITTLE

Curriculum Staff Assigned: JOHN BARTON

Task Analyst (s): EARLE HINTON

Date Analysis Completed: 11-1-77

*NOTE: This occupation is a key occupation in Oregon as identified by Oregon Criteria.

TASK INVENTORY REVIEW COMMITTEE

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OREGON DEPARTMENT
OF EDUCATION
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TASK INVENTORY

PAINTER

Job Title

Earle Hinton

Analyst

INSTRUCTIONS

List each manipulative and knowledge skill relating to the job listed above. To the right of the page are three sections of columns asking specific questions about the Entry Level, Frequency of Performance and Instruction Attained At. An "X" should be placed, by the analyst, opposite each task in the appropriate box of the "ENTRY LEVEL" and "FREQUENCY OF PERFORMANCE" sections. Section three, "INSTRUCTION ATTAINED AT" is to be completed by state representative persons selected by the state department specialist.

Duty No.	Task No.	Task Description	Entry Level		Frequency of Performance			Instruction Attained at			
			Entry	On The Job	Small Amount	Average Amount	Great Amount	High School	Community College	On-the-Job Training	Related Training
1	0	Performs General Painters Tasks									
	1	Read architectural blue prints	X			X					
	2	Read architectural specifications	X			X					
	3	Read architectural color schedules	X			X					
	4	Make color draw downs or chips		X		X					
	5	Stir and adjust paint		X			X				
	6	Tint paint to desired color		X		X					
	7	Select proper paint paddles		X			X				
	8	Use a chalk line		X	X						
	9	Use a tape measure to verify areas & graphic layout		X	X						
	10	Use a spirit level to plumb lines and level		X	X						
	11	Protect surfaces with masking materials		X		X					
	12	Select masking materials		X		X					
	13	Identify various woods	X		X						
	14	Color putty to match woods		X		X					
	15	Putty nail holes		X			X				
	16	Read lable directions	X				X				
	17	Identify various paints, stains and clear-finishs	X				X				
	18	Identify different types of construction	X			X					
	19	Select various ladders safely	X			X					
	20	Color and apply stains		X	X						
	21	Identify various wall construction	X			X					
	22	Stain woods		X		X					
	23	Use and read moisture meter		X	X						
	24	Paint by spray, brush and rollers		X			X				
	25	Tie knots and hitches		X	X						
	26	Read various instruction manuals	X			X					
	27	Use OSHA approved protective clothing & equipment	X				X				
2	0	Prepare surfaces for Painting									
	1	Patch cracks in plaster		X		X					
	2	Fill voids on all surfaces		X			X				
	3	Wash to remove all grease		X		X					
	4	Remove burrs and foreign matter		X		X					
	5	Select abbrasives for sanding surfaces	X				X				

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	6	Select proper size knives (putty and broad knives)	X				X				
	7	Remove and replace necessary hardware		X	X						
	8	Reglaze sash		X	X						
	9	Use blow torch for burning off paint		X	X						
	10	Use steel brush and scrapers to remove rust		X		X					
	11	Sandblast to remove foreign materials		X		X					
3	0	Paint With Air Compressor & Conventional Spray Equip.									
	1	Read instructions	X		X						
	2	Protect adjacent areas by dropsheet and masking		X			X				
	3	Select size of air compressor	X		X						
	4	Select proper type and size spray gun	X				X				
	5	Select proper spray pot	X				X				
	6	Regulate fluid and air pressure		X			X				
	7	Repair spray guns		X			X				
	8	Clean equipment with proper solvent		X			X				
4	0	Painter Operates Airless Compressor									
	1	Read instructions	X		X						
	2	Select proper gun	X				X				
	3	Select correct size fluid tip	X				X				
	4	Adjust pressure		X			X				
	5	Make minor repairs		X		X					
	6	Clean with proper solvent		X			X				
5	0	Paints With Brushes									
	1	Select proper nylon or bristle brushes	X				X				
	2	Use bristle brush with oil paint only		X		X					
	3	Use nylon bristle in both oil or latex paints		X			X				
	4	Select wall, flat trim, angular sash, various size varnish and enamel, massonry brushes and wire brushes	X				X				
	5	Use painter dusting brush		X			X				
	6	Read directions for cleaning brushes	X				X				
	7	Clean brushes with proper solvents		X			X				

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6	0	Paints With Roller Application									
	1	Select lambs wool and man-made naps	X				X				
	2	Protect adjacent areas from spatters		X			X				
	3	Use proper length nap for various type paints	X				X				
	4	Select and use proper size of roller frame		X			X				
	5	Select and use roller pole where needed		X			X				
	6	Clean with proper solvent and wire brush		X			X				
	7	Select proper cutting brush to cut in trim	X				X				
	8	Clean up roller frame and naps with proper solvent		X			X				
7	0	Use Various Types of Ladders									
	1	Select the type of ladders for the job	X			X					
	2	Apply safety shoes to ladders		X	X						
	3	Select and use ladder jacks and planks		X		X					
	4	Raise extension ladders safely		X		X					
	5	Lower extension ladders safely		X		X					
	6	Store properly		X		X					
8	0	Rig Electric Swing Scaffolding									
	1	Study manual for operation	X		X						
	2	Place lookouts or lateral supports		X		X					
	3	Hook up electric cable to operate scaffold		X		X					
	4	Suspend scaffold cable		X		X					
	5	Secure safety lines for workers		X		X					
	6	Use proper safety harness		X		X					
	7	Tie various rope knots		X		X					
	8	Clean oil and store equipment		X		X					
9	0	Rig "Hand Rope Falls" Swinging Scaffold									
	1	Place hook or lookouts		X		X					
	2	Select proper length of falls needed		X							
	3	Visually inspect the ropes		X							
	4	Line upsteel stur-up and bulster to proper positions		X							
	5	Set proper approved planks		X							
	6	Set proper approved back rail		X							

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9	7	Set Toe Board		X			X				
	8	Set falls to stage and lookouts or hooks		X			X				
	9	Plumb falls visually from lookouts to stage		X			X				
	10	Secure hand lines and safety lines		X			X				
	11	Use proper safety harness		X			X				
	12	Dismantle scaffolding		X			X				
	13	Weave falls for storage		X			X				
	14	Coil hand and safety lines		X			X				
	15	Clean and store scaffolding		X			X				
10	0	Set Up Tubular Scaffolding									
	1	Read Safety Code	X			X					
	2	Set first section on casters or jacks		X	X						
	3	Set various braces		X	X						
	4	Place planking as needed		X	X						
	5	Place sections as needed		X	X						
	6	Disassemble and store		X	X						
11	0	Paints Interior &Exterior Metal, Wood, Stucco, Cement, Plaster and Sheet Rock									
	1	Refer to specifications for interior or exterior surfaces and color schedules for correct paint	X			X					
	2	Read labels on cans	X			X					
	3	Fill cracks and voids with spackle, plaster or caulk		X			X				
	4	Fill set nail holes and cracks with putty		X		X					
	5	Select method of application	X			X					
	6	Stir and adjust paints		X			X				
	7	Tint paints to proper hue		X		X					
	8	Obtain color approval		X			X				
	9	Protect adjacent surfaces with masking tape, masking paper and drop sheets		X			X				
	10	Apply prescribed primer		X			X				
	11	Smooth with proper grit abbrasives		X			X				
	12	Apply prescribed number of coats		X			X				
	13	Allow proper drying time between coats		X			X				
	14	Clean up splatters and remove masking materials		X			X				

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12	0	FINISHES TRANSPARENT & TRANSLUCENT COATING ON WOODS									
	1	Refer to specifications and color schedules	x			x					
	2	Protect adjacent surfaces by masking & covering		x			x				
	3	Read labels on cans	x				x				
	4	Determine method of application	x				x				
	5	Stain wood designated color		x			x				
	6	Wipe stain when necessary		x			x				
	7	Apply finish coat of selected transparent finish		x			x				
	8	Color putty and fill nail holes		x		x					
	9	Apply designated coats & types of clear finishes		x			x				
	10	Sand with proper grit abrasive		x			x				
	11	Remove masking materials		x			x				
	12	Clean equipment with proper solvent		x			x				